

VASCULAR FLORA OF DEVILS POSTPILE NATIONAL MONUMENT,
MADERA COUNTY, CALIFORNIA

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ABSTRACT

Devils Postpile National Monument is 319 ha in size, located in Madera County, California, on the western slope of the Sierra Nevada at an average elevation of 2280 m. Though small in size, the monument supports diverse habitats, including forests, chaparral, riparian corridors, meadows, seeps, and ponds. In 2001, the National Park Service conducted a survey to 1) inventory the vascular flora and document with vouchered specimens; and 2) describe the distribution and abundance of species of special management concern (rare and/or non-native). Methods coupled a species-level inventory with vegetation mapping, covered an estimated 70 percent of the monument's surface area, and combined broad and targeted search strategies. Survey results yielded a 121 percent increase (from 169 to 373) in the number of documented plant taxa, representing 60 families and 199 distinct genera. Forty-five percent of species were clustered within six families: Asteraceae, Poaceae, Cyperaceae, Brassicaceae, Onagraceae, and Boraginaceae. The survey found three rare and eight non-native taxa previously unknown from the monument and documented nine potential range extensions. Rare species included *Cinna bolanderi* (new county record), *Hulsea brevifolia*, and *Mimulus laciniatus*. Localized infestations of the non-native and invasive *Cirsium vulgare* were discovered. Control measures for this species were initiated during the field season and continued in subsequent years.

Key Words: collections, Devils Postpile National Monument, flora, inventory, monitoring, vegetation survey.

Devils Postpile National Monument is managed by the National Park Service for its outstanding geologic features and natural beauty. Located in Madera County, California, high on the western slope of the Sierra Nevada near the town of Mammoth Lakes (Fig. 1), the monument attracts hundreds of thousands of visitors each year (average for years 2000–2010 = 118,381). Primary attractions include the hexagonal basalt columns for which the monument is named and the picturesque 30 m drop of Rainbow Falls on the Middle Fork San Joaquin River. Of the 319 ha (798 acres) of Devils Postpile National Monument, 273 ha (674 acres) are designated as part of the Ansel Adams Wilderness. Both the John Muir and Pacific Crest Trails transect the monument.

During the summer of 2001, we completed a floristic inventory of the vascular plants in Devils Postpile National Monument and established vegetation plots as part of a vegetation mapping program for Sierra Nevada parks. Both of these efforts are components of the natural resource inventory phase of the National Park Service (NPS) Inventory and Monitoring Program for

the Sierra Nevada Network parks (Devils Postpile National Monument, Sequoia and Kings Canyon National Parks, and Yosemite National Park). The primary purpose of the NPS natural resource inventories is to document the presence of resources in parks, and to assess and document the current condition and knowledge of these resources. Inventories allow comparison of existing conditions to reference conditions or the desired state of parks and establish a solid baseline for making scientifically sound management decisions (National Park Service 2009). In keeping with the goals of the NPS Inventory and Monitoring Program (Fancy et al. 2009; National Park Service 2009), the two main objectives of this study were: 1) to document the occurrence of at least 90 percent of the species of vascular plants occurring in the monument with vouchered specimens; and 2) to describe the distribution and abundance of species of special management concern, specifically, those designated as rare, threatened, endangered or invasive non-natives. Results from this survey were initially reported in an unpublished report submitted to

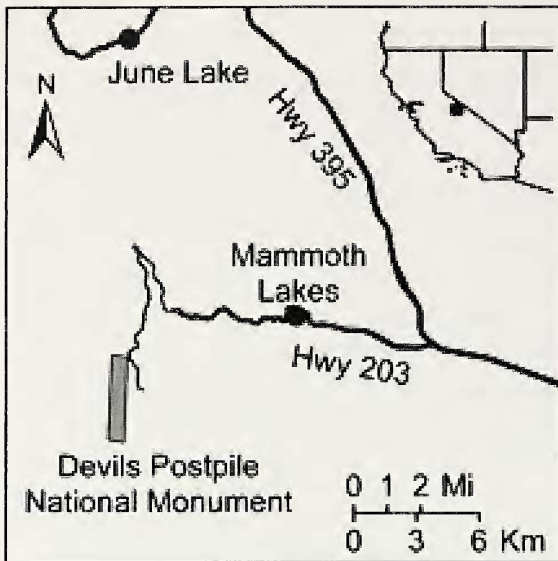


FIG. 1. Map of Devils Postpile National Monument and surrounding areas. Devils Postpile National Monument is located in Madera County, California, high on the western slope of the Sierra Nevada near the town of Mammoth Lakes.

the Sierra Nevada Inventory and Monitoring Network (Arnett and Haultain 2005).

Prior to this survey, available data on the flora of Devils Postpile National Monument were limited in the number of years collected, the geographic extent of areas surveyed, the percentage of vascular plants documented, and the locations of vouchered specimens. The estimated percentage of vascular plants captured by prior surveys was 82%, a figure based on surveys conducted from 1974–1980, an unpublished vascular plant list (Medeiros 1996), and consultation with local experts (National Park Service 2001). The flora was known primarily from collections made by park naturalists in four years: 1972, 1977, 1978, and 1980. K. Ann Hoffmann made 77 collections in 1972 representing 77 taxa in 27 families; Joseph L. Medeiros made 42 collections in the period between 1976 and 1980 representing 42 taxa in 21 families; Sandra C. Morey made 131 collections in 1980 representing 120 taxa in 28 families. The species list produced from these investigators included 235 taxa; however, only 169 of these were documented with herbarium vouchers. The labels of these vouchers, housed in the Devils Postpile National Monument Herbarium (DEPO), reveal that 99 percent or more of the collections were made along the Rainbow Falls Trail and in Soda Springs Meadow, both of which are in the eastern half of the monument in the vicinity of Middle Fork San Joaquin River (Fig. 2).

These earlier collection efforts documented two rare and two non-native plant species. The two

rare taxa, *Lupinus duranii* Eastw. and *Hulsea brevifolia* A. Gray, are both listed in the Inventory of Rare and Endangered Plants of California (CNPS 2014). The current status of these taxa in the monument is discussed under Results/Rare and Endangered Taxa, below. The non-native taxa documented were *Taraxacum officinale* F.H. Wigg. and *Phleum pratense* L.

DESCRIPTION OF THE STUDY AREA

Geology

Devils Postpile National Monument sits at an average elevation of 2280 m (7600 feet [ranging from 2200–2500 m; 7200–8200 feet]) just below the Sierra Crest on the west slope of the Sierra Nevada. The postpile formation for which the monument is named is only one of the many manifestations of the widespread volcanic activity in this part of the Sierra Nevada. The basalt columns of the postpile were formed under a unique set of conditions: ample volume of magma, slow cooling time, and homogeneity of mineral composition (Huber and Eckhardt 1985). Glaciers that flowed down the valley of the Middle Fork San Joaquin River eroded most of the lava flows of the area and exposed the rocks that we see in the monument today. Other major geologic units in the monument include andesite of Mammoth Pass, rhyodacite of Rainbow Falls, and basalt of the Buttresses (Clow and Collum 1985, Fig. 2). The soils are mostly sandy with a thin surface layer of loose pumice, but in the meadows there is some development of organic material.

Climate

The monument's climate is a reflection of its proximity to the Sierra Nevada Crest and the Mediterranean-type weather patterns of California. Characterized by cold, wet winters and warm, dry summers, the majority of precipitation at the monument falls in the form of snow during the winter months. Temperatures during winter storm events remain at or below freezing. Between-storm diurnal fluctuations are more extreme, with daytime temperatures reaching 15°C, and recorded lows sometimes below -18°C. Summer temperatures are moderate, with warm days and cool nights. Clear skies and low humidity are typical, but localized afternoon showers and flash floods created by monsoon patterns are possible during the summer months (Balmat and Scott 2010).

Vegetation

Near the headwaters of the Middle Fork San Joaquin River, this high-Sierra river corridor

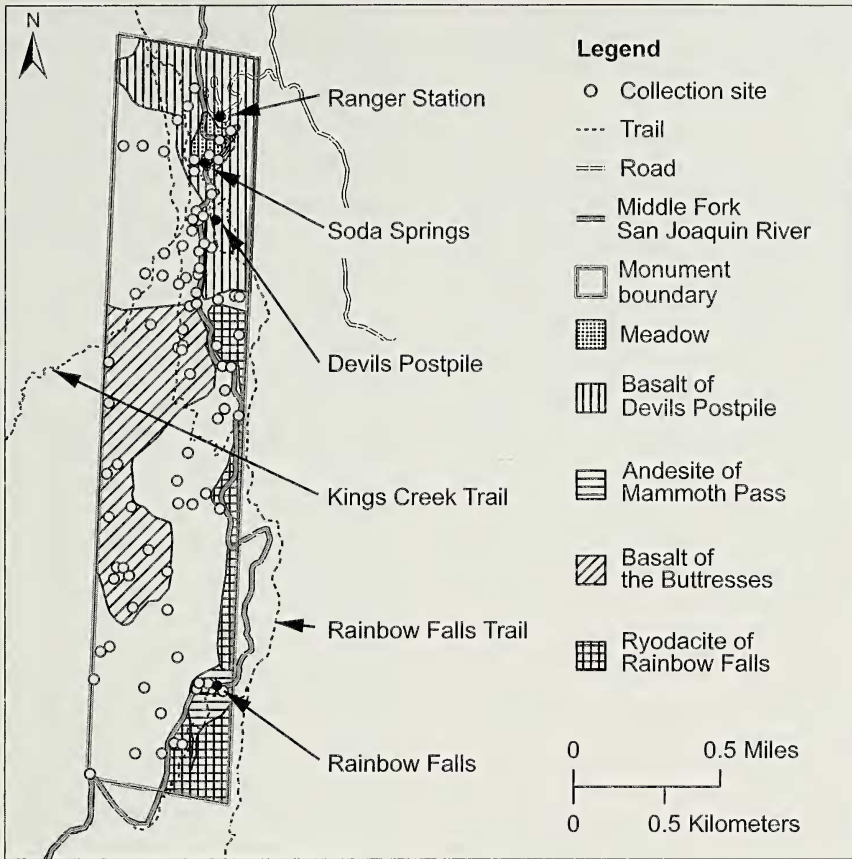


FIG. 2. Map of Devils Postpile National Monument showing major features, major geologic units (adapted from Clow and Collum, 1985) and location of collection sites. The postpile after which the monument is named is composed of hexagonal basalt columns. Other major geologic units in the monument are older in origin and include andesite of Mammoth Pass, rhyodacite of Rainbow Falls, and basalt of the Butresses. Collections were made wherever a new taxon was encountered. Efforts were made to maximize the number of specimens collected at each site. Each collection site therefore comprises an area approximately 25 m² in size. Though the gaps between collection sites were searched, no collections were necessary in these areas.

supports rich forests and verdant meadows. Species characteristic of both the wetter western and drier eastern slopes of the Sierra Nevada are present in Devils Postpile National Monument because of its proximity to the Sierra Nevada Crest. The monument falls within the central High Sierra Nevada geographic subdivision described by Baldwin et al. (2012). Though small in size, the monument is diverse enough in its topography and geology to support a number of different plant communities, including forests, chaparral, meadows, seeps, ponds, and riparian systems.

Forests and Chaparral. *Pinus contorta* Loudon subsp. *murrayana* (Grev. & Balf.) Critchf. (lodgepole pine), which is prevalent in lowland communities, gives way to upland coniferous forests that include mixes of *P. jeffreyi* Balf. (Jeffrey pine), *P. monticola* Douglas ex D. Don (western white pine), *Abies magnifica* A. Murray bis (red

fir), and *A. concolor* Lindl. (white fir). At the higher, drier elevations, these taxa also occur with occasional *Juniperus grandis* R.P. Adams (Sierra juniper) and *Pinus albicaulis* Engelm. (whitebark pine). The understory of these coniferous forests is relatively sparse on mid- to high-slopes, with *Carex rossii* Boott, *Eriogonum nudum* Douglas ex Benth., *Gayophytum* spp., *Hieracium albiflorum* Hook., *Monardella odoratissima* Benth. subsp. *pallida* (A. Heller) Epling, *Phacelia hydrophyloides* Torr. ex A. Gray, *Stephanomeria tenuifolia* (Raf.) H.M. Hall, and *Stipa occidentalis* Thurb. ex S. Watson being the most abundant herbs. Dry, sunny forest openings support small patches of chaparral consisting of various mixes of *Arctostaphylos nevadensis* A. Gray, *A. patula* Greene, *Ceanothus cordulatus* Kellogg, *Prunus emarginata* (Douglas) Eaton, *Quercus vaccinifolia* Kellogg, *Ribes cereum* Douglas var. *cereum* and *R. roezlii* Regel var. *roezlii*. Sunny openings also support numerous large stands of *Pteridium*

aquilinum (L.) Kuhn var. *pubescens* Underw. in both moist and dry drainage bottoms. Only one aspen stand of significant size is found in the monument.

Meadows. On low-slopes and in drainage bottoms, accumulated moisture allows montane meadow vegetation to flourish. Common species found in the meadows include *Carex* spp., *Epilobium* spp., *Equisetum arvense* L., *Horkelia fusca* Lindl. var. *parviflora* (Nutt. ex Hook. & Arn.) Wawra, *Lilium kelleyanum* Lemmon, *Lupinus polyphyllus* Lindl. var. *burkei* (S. Watson) C.L. Hitchc., *Maianthemum racemosum* (L.) Link, *M. stellatum* (L.) Link, *Mimulus* spp., *Platanthera leucostachys* Lindl., *Primula jeffreyi* (Van Houtte) A.R. Mast & Reveal, and *Trifolium* spp.

Seeps and Ponds. Seep vegetation is relatively common and contributes significantly to the diversity of the flora of Devils Postpile National Monument. Characterized by high amounts of soil moisture, the seeps support micro-communities including *Allophyllum integrifolium* (Brand) A.D. Grant & V.E. Grant, *Deschampsia danthonioides* (Trin.) Munro, *Hypericum anagalloides* Cham. & Schtldl., *Lithophragma glabrum* Nutt., *Microsteris gracilis* (Douglas ex Hook.) Greene, *Mimulus* spp., *Polygonum douglasii* Greene, and *Trifolium monanthum* A. Gray. Shallow ponds are common in the monument and further increase habitat diversity within the wetland-upland matrix.

Riparian. *Alnus incana* (L.) Moench subsp. *tenuifolia* (Nutt.) Breitung, *Cornus sericea* L. subsp. *sericea*, and *Salix* spp. are the dominant woody species along the banks of the Middle Fork San Joaquin River. *Populus trichocarpa* Torr. & A. Gray (black cottonwood) occasionally dot the banks, while *Arnica mollis* Hook., *Chamerion angustifolium* (L.) Holub, *Helenium bigelovii* A. Gray, and *Sphenosciadium capitellatum* A. Gray are more common along river banks. Intermittent riparian habitats support species such as *Allium validum* S. Watson, *Carex* spp., *Mimulus guttatus* Fisch. ex DC., *M. lewisii* Pursh, and *Toxicoscordium venenosum* (S. Watson) Rydb. var. *venosum*.

Disturbance

During 2004, fire-history sampling was conducted in the monument. Partial sections from fire-scarred trees were used to date past fire events. Results indicate moderate fire frequency over much of the monument. The mean fire return interval for four sites ranged from 14 to 18 years over a time span from about 1700 to 1860 AD (Caprio et al. 2006). Longer intervals between fires were indicated in the northwest

corner of the monument where *Tsuga mertensiana* (mountain hemlock) and *Pinus monticola* (western white pine) occur.

The Rainbow Fire was ignited by lightning on August 20, 1992 south of Devils Postpile National Monument in the Inyo National Forest. Strong winds moved the canopy fire northward up the Middle Fork San Joaquin River from its point of origin near Pond Lily Lake. When the winds died down, the fire slowed and dropped to the forest floor, burning in surface fuels. Approximately two-thirds of the monument was affected by the fire. In many areas, fire crept along the forest floor, occasionally burning into trees. The southeast portion of the monument shows signs of high-severity, wind-driven fire with high tree mortality. The fire history results indicate fire was not an unusual event in most of the monument's forest communities; however, the absence of fire for 105 to 120 yr before 1992 was unprecedented and probably contributed significantly to the severity of the Rainbow Fire (Caprio et al. 2006).

Most of the human activity and disturbance occurs near the eastern border of the monument, where visitation is concentrated around the postpile formation, Rainbow Falls, campgrounds, and the ranger station (Fig. 2). Fishing is extremely popular in this part of the Sierra. Soda Springs Meadow and the gravel bars nearest the ranger station are heavily used by fishermen, resulting in the formation of unmaintained social trails, or "fishing trails". Horses and pack stock travel throughout the monument on the maintained trails. Visitation in the western half of the monument, especially to the south, is limited to hikers passing through on the King Creek Trail or the John Muir and Pacific Crest trail corridor (Fig. 2). Disturbance is therefore limited in these regions.

METHODS

Search strategies and collection protocols were designed to accomplish the goals of documenting the occurrence of at least 90 percent of the species of vascular plants occurring in Devils Postpile National Monument with vouchered specimens and of describing the distribution and abundance of rare, threatened, endangered native species, and invasive non-native species. The survey was conducted by Melanie Arnett during the 2001 field season, which extended from June 18th through September 7th.

To obtain a thorough coverage of the monument and its habitats, Arnett combined broad searches aimed at covering as much area as possible with targeted searches of specific plant communities and habitat types. Because of the monument's relatively small size, it was possible to cover 70 percent or more of the total surface

area on foot using this approach. With respect to habitat types, Arnett intermingled breadth with depth by visiting all habitat types found within the monument and thoroughly searching those likely to house species underrepresented in the previously-documented flora. Unique areas were visited repeatedly to capture plants at different phenological stages and to maximize the number of species documented by the survey.

Habitat-Specific Targeted Searches

Targeted searches enabled Arnett to document the distribution and abundance of both rare and non-native plant taxa occurring within the monument. A preliminary list of 43 “special-status” plants listed as rare by CNPS (Lists 1–4) that were either known or considered likely to occur in the monument was used to inform directed searches for rare and/or sensitive taxa (CNPS 1994–2001; Jones and Stokes 2001). Only two such taxa had previously been documented in the park. The majority of this list comprised potentially-occurring taxa documented to occur in areas adjacent to the park via searches of several data sources including collections at major California herbaria; the sensitive plant list for Inyo National Forest; and the California Natural Diversity Database (CNDDB 2000) (see Jones and Stokes 2001 for a complete list of data sources and “special-status” criteria).

Habitat-specific searches were conducted for non-native invasive species. Population size was estimated for all non-native taxa encountered; invasive species were pulled out by the roots and left to decompose on site. Plants too big to be pulled were chopped down as close to ground level as possible. Seed heads or fruits that could potentially mature were either removed or destroyed, depending on their level of maturity.

In addition to these surveys, a team of National Park Service botanists established 57 vegetation plots between July 25th and July 30th, 2001 to ground-truth the draft vegetation map of the monument. The draft map included 35 unique vegetation mapping units representing twelve alliances consistent with Yosemite National Park’s draft vegetation classification report, published after this study (Keeler-Wolf et al. 2012). Plots were established according to standardized sampling protocols developed by the National Park Service vegetation mapping program (The Nature Conservancy and Environmental Systems Research Institute 1994), and were located in a representative area of each delineated polygon. Arnett accompanied the crew, and while the NPS botanists established and intensively sampled the plots, Arnett conducted extensive surveys of the corresponding polygons. Their combined efforts ensured that all 35 mapping units were visited over the course of

the field season, and that habitats containing under-represented plant communities were searched in a thorough manner.

Documentation of Plant Taxa

Representative specimens of all vascular plant taxa encountered within the 319 ha of the monument were collected in order to document the vascular flora of Devils Postpile National Monument. At each collection site, UTM coordinates were recorded using a Garmin GPS 12 Personal Navigator™, and notes were taken on the aspect, percent slope, slope position, substrate, surface material, elevation, and plant community associated with the site. When possible, all parts of the plant necessary for identification were collected, and enough material for at least two full herbarium sheets was included. The field season included a total of 23 field collection days between June 18th and September 7th. Relative abundance of each taxon was estimated at the end of the field season.

Collections were made wherever a new taxon was encountered; however an effort was made to maximize the number of specimens collected at each site in order to increase efficiency. The majority of specimens were collected in June and July (Table 1). On average, 10 specimens per site were collected in June, 3.5 in July, one in August, and two in September. Figure 2 illustrates the location of collection sites, each of which represents an area of approximately 25 m². Though the large gaps without collection sites were searched, no collections were necessary in these areas. The highest concentration of collection sites was along the river, in riparian habitats and meadows, where species richness was highest.

Hickman (1993), Munz (1965 and 1968), Botti (2001), and Cronquist et al. (1977) were the primary references used for identifications. Nomenclature originally followed Hickman (1993), and has been updated for this publication to follow the second edition of the Jepson Manual (Baldwin et al. 2012; Jepson Flora Project 2013). A total of 338 specimens were verified at the University and Jepson Herbaria in Berkeley, California (UC & JEPS) during the weeks of 9–13 July and 10–14 September 2001. The remaining 139 specimens were subsequently verified at the Rocky Mountain Herbarium in Laramie, Wyoming (RM). Dr. Allan Smith determined the ferns and Dr. Robert Dorn determined the willows. All other determinations were made by Melanie Arnett.

Vouchers from this study are deposited at the DEPO, Jepson, and RM herbaria. Vascular plant collection and distributional data compiled for this study are stored in an Access database, as are vegetation mapping plot data. Spatial data are stored in ArcView project files. Digital data are

TABLE 1. NUMBER OF SPECIMENS COLLECTED FOR EACH DAY/MONTH.

Total specimens collected	Date	Number of collection sites	Number of specimens collected
June	18 Jun 2001	8	34
	20 Jun 2001	2	31
	22 Jun 2001	4	40
	23 Jun 2001	4	60
	24 Jun 2001	7	47
	25 Jun 2001	3	15
	26 Jun 2001	3	30
	27 Jun 2001	1	14
	June TOTAL	32	271
July	3 Jul 2001	6	41
	5 Jul 2001	3	6
	15 Jul 2001	5	19
	22 Jul 2001	3	17
	24 Jul 2001	2	2
	25 Jul 2001	7	33
	26 Jul 2001	4	11
	27 Jul 2001	6	18
	28 Jul 2001	6	24
	29 Jul 2001	5	11
	30 Jul 2001	4	8
	July TOTAL	51	190
	August	6 Aug 2001	1
7 Aug 2001		2	2
18 Aug 2001		3	3
August TOTAL		6	6
September	7 Sep 2001	5	10 (primarily conifers)

stored at Sequoia and Kings Canyon National Parks, where they are managed by the park plant ecologist.

RESULTS

The total number of vascular plant taxa now documented from Devils Postpile National Monument is 373 (List 1), representing a 121 percent increase over previous studies. We collected 507 specimens representing 343 taxa over the course of this study. From these specimens, 935 vouchers were produced; one complete set was deposited in the DEPO Herbarium, and duplicates, when available, were deposited at the Jepson and the Rocky Mountain herbaria (List 1). This study increased the total number of vouchers in the DEPO Herbarium from 287 to 754. A floristic summary for the monument is shown in Table 2.

Two of the 43 potentially-occurring special status plants identified in Jones and Stokes (2001) were found: *Hulsea brevifolia* and *Mimulus laciniatus*.

Based on a 121 percent increase in the number of recorded vascular plant taxa, and the combination of both targeted surveys and plot-based sampling, we estimate that 90 percent or more of the vascular flora of Devils Postpile National Monument is now documented with vouchered specimens. At least 19 taxa that were previously documented with herbarium vouchers were not encountered during the field season of 2001, but vouchers were examined and confirmed by Arnett. An additional 25 taxa in List 2 were reported in the monument but never vouchered, or, if they were vouchered they were redetermined during the course of this study; these taxa may occur in the monument but they were not encountered during the 2001 field season.

TABLE 2. FLORISTIC SUMMARY OF VASCULAR PLANT TAXA OF DEVILS POSTPILE NATIONAL MONUMENT.

Clade	Families	Genera	Species		
			Native	Non-Native	Total Species
Lycophyta	1	1	1	0	1
Ferns	4	7	8	0	8
Gymnosperms	2	4	8	0	8
Eudicots	39	154	257	5	262
Monocots	13	39	90	3	93
Total	59	205	364	8	372

Rare and Endangered Taxa

No federally or state listed rare or endangered plants are known to occur within Devils Postpile National Monument. Three species cited in the Inventory of Rare and Endangered Plants of California (CNPS 2014) were documented in this study. Two of these species were included in the Jones and Stokes draft list of special status plants prepared for the monument (Jones and Stokes 2001). One taxon that had previously been documented in the monument, *Lupinus duranii* (List 1B), has since been redetermined to *Lupinus lepidus* var. *sellulus*.

Cinna bolanderi (Poaceae), known from Fresno, Mariposa, and Tulare counties, is documented from one collection in the monument: *Melanie Arnett 8425*. This taxon is on the CNPS List 1B, and has a threat rank of 0.2. There is only one other record for this taxon in Madera County, *M.B. Dunkle 4685* (POM364968 n.v.), collected in 1935 at Reds Meadow. The site at which this specimen was collected typifies the known habitat of *Cinna bolanderi*: a moist SSW-facing, spring-fed drainage surrounded by Jeffrey pine/ red fir forest. Vouchers from the specimen collected by Arnett are deposited at both the DEPO and Jepson herbaria.

Hulsea brevifolia (Asteraceae), known from El Dorado, Fresno, Madera, Mariposa, Tulare, and Tuolumne counties, is documented from nine collections in Devils Postpile National Monument: *Joseph L. Medeiros and W. Eckhardt s.n.*; *Sandra C. Morey 154*; *Dieter H. Wilken 8241* (SEINET480163, SD74615, UCD133277, UCSB26631); *G. L. Stebbins Jr. 2617* (UC797814); *Peter H. Raven 3685* (CAS372031); *H. Williams s.n.* (UCSB17604); *Melanie Arnett 8110* (JEPS99762), *Melanie Arnett 8192*, and *8401*. This taxon is on CNPS List 1B; its threat rank is 0.2. It is interesting to note that the morphologic differentiation between *H. brevifolia* and *H. mexicana* is the number of ray flowers (10–23 and 20–35 respectively) and whether the corolla tube hairs are a mixture of glandular and nonglandular hairs, in the case of the former, or of all glandular hairs, as in the latter (Wilken 2013). This distinction was not apparent in the specimens examined at the UC & JEPS Herbaria. *Hulsea mexicana*, known in the U.S. from only a single location (San Diego County), grows in volcanic substrates and in burned or disturbed sites. At the time of this survey, *H. brevifolia* was quite common in volcanic substrates in the post-fire region of the monument. Vouchers from this study are deposited at the DEPO, JEPS, and RM herbaria.

Mimulus laciniatus (Phrymaceae), known from Amador, Butte, Fresno, Madera, Mariposa, Plumas, Tulare, and Tuolumne Counties, is documented from two collections in the monu-

ment: *Melanie Arnett 8026*, and *8309*. This taxon is on the CNPS watch list (List 4), and its threat rank is 0.3. Both collections of this taxon were made from seeps on granite, which is in accordance with the habitat given in the Jepson eFlora (Jepson Flora Project 2013).

Non-native Taxa

Of the eight non-native taxa (List 1) that were documented, *Cirsium vulgare* (bull thistle) was the only taxon that appeared to be rapidly expanding. Numerous populations of this taxon, each consisting of 5–250 individuals, were encountered, especially in the area known as the Buttresses (Fig. 2). Removal efforts began for *C. vulgare* in 2001; follow-up control measures were implemented on all populations of *C. vulgare* in subsequent years (see Methods). The majority of the other non-native taxa were more localized, occurring near the ranger station in and around the meadows that are used for access to fishing (Fig. 2).

Potential Range Extensions

Based on the range descriptions provided in the Jepson Flora Project (2013), nine range extensions were documented with this inventory (List 3). The extension of these ranges included six elevation extensions, which varied from a difference of 200 m to 1000 m in elevation. Four taxa documented through this survey represent new occurrences within the central High Sierra Nevada subdivision of California.

DISCUSSION

The results of this inventory support Erter's (2000) assertion that comprehensive, species-level inventories are *not* too cumbersome to be of value, as is generally assumed from both a logistical and financial standpoint. The small size of Devils Postpile National Monument provided ideal conditions for coupling a species-level inventory with vegetation mapping in a timely and fiscally responsible manner, as is outlined by the Inventory and Monitoring program and advocated by Charlet (2000). The results of this inventory emphasize the fact that a small-scale inventory can yield large-scale results. The 121 percent increase in the documented flora of the monument brings with it numerous other data that are valuable to managers and researchers in many fields of study. Nine probable range extensions were documented (List 3). Two rare species that were previously unknown in the monument were documented, one of which represents a new Madera county record. An infestation of the invasive thistle *Cirsium vulgare* in a portion of the monument that seldom, if

ever, sees human visitors was detected in time to enlist support from the National Park Service - California Exotic Plant Management Team and successfully control populations (National Park Service 2011). In addition, List 2 and 4 offer resource managers an idea of which plant taxa to look for in the future in order to continue increasing our knowledge of the flora of Devils Postpile National Monument.

The results of this inventory have also assisted the parks within the Sierra Nevada Inventory and Monitoring Network (SIEN) in subsequent resource management planning efforts, including invasive species and resource management plans. Early detection efforts enabled the implementation of rapid response protocols and successful invasive species management (National Park Service 2011). Data from the results of this study will be useful as Devils Postpile National Monument prepares its resource stewardship strategy and will be available for use in interpretive programs that enrich the visitor experience.

Opportunities for Future Research

As mentioned in the introduction, the flora of Devils Postpile National Monument contains characteristics of both east- and west-side Sierra Nevada floras. There were 373 taxa found in this 319 ha study area, compared to 446 taxa found in a 4400 ha floristic study of the San Joaquin Roadless Area, managed by Inyo National Forest and just east of Devils Postpile National Monument (Constantine-Shull 2000). Other floristic studies in the area include Howald (1983), Bagley (1988), and Taylor (1981). In a comparative analysis of 13 high-elevation floras, conducted by Constantine-Shull, the flora of the San Joaquin Roadless Area was found to be floristically more similar to other westside floras of the Sierra Nevada than to those of the eastside. Of the westside floras, however, this one had the highest similarity to eastside floras included in the analysis. Devils Postpile National Monument was not included in the analysis, due the absence of grasses, sedges, and willows on the species list at the time. Were the results of this survey to be included in such an analysis, we hypothesize that the flora of Devils Postpile would be in a position close to the San Joaquin Roadless Area with respect to other Sierra Nevada floras.

All floras and florulas represent a snapshot in time of the botanical inventory of an area, and at least some changes are expected, and inevitable, over time. Continued exploration of the monument is desirable, especially additional focused searches for taxa documented to occur nearby but not yet found within the monument. Since this study was conducted, the development of the online Consortium of California Herbaria (CCH)

has vastly improved the ability to access a large volume of herbaria records. A recent search yielded six taxa collected within the monument that were not encountered during this study and for which vouchers were not verified. These collections were made between 1935 and 1980, and it is possible that these taxa no longer occur within the Monument but should be included among the list of plants to watch for in Devils Postpile. These taxa are included in list 4.

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APPENDIX I

LIST I

The vascular plant checklist for Devils Postpile National Monument. List is organized by clade following the second edition of *The Jepson Manual* (Baldwin et al. 2012) and online Jepson eFlora (Jepson Flora Project 2013), then by family and taxon name (alphabetical order within family). Abundance is given for each taxon (local: occurring occasionally in small populations, occasional: occurring occasionally as individuals, locally common: occurs occasionally in larger populations, locally abundant: occurs often in dense stands, uncommon: unlikely to be encountered and sometimes not present in appropriate habitats, and abundant: very likely to be encountered/ nearly always found in appropriate habitats, sometimes forming dense stands). Taxa preceded by an asterisk (*) are non-native, and those by a broken diamond symbol (❖) are listed in the California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2014). Habitat or vegetation community type information is given when available, and reflects information

taken from voucher labels as well as vegetation mapping plot data. Taxa that were not collected in this study are cited from collections made by the following collectors: KAH = K. Ann Hoffmann, SCM = Sandra C. Morey, JLM = Joseph L. Medeiros, JN = Jan Nachlinger; collection numbers were not supplied with the specimens of the latter two collectors. Voucher records from these collectors held in the DEPO herbarium but not referenced here are available upon request from the National Park Service Sierra Nevada Network Inventory and Monitoring Network data manager (<http://science.nature.nps.gov/IM/units/sien/>) and/or the corresponding author. All collection numbers higher than 8000 are from collections made by Melanie Arnett (MA) with or without Sylvia Haultain, Linda Mutch, and/or Daniel Phipps McCoy. Collection numbers presented in the format 'DEPO.[plot number].[collection number]' represent vegetation mapping plot vouchers. Specimens were deposited in the following herbaria (DEPO = Devils Postpile National Monument Herbarium (DEPO), Jeps. Herbarium (JEPS), and Rocky Mountain Herbarium (RM)). Accession numbers assigned by JEPS provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/); online posting of accession numbers assigned by RM is in progress and not yet available when this manuscript was prepared for press.

FERNS AND LYCOPHYTES

Dennstaedtiaceae

Pteridium aquilinum (L.) Kuhn var. *pubescens* Underw., locally common, mixed red fir - white fir forest, mountain alder thicket, and seasonally flooded riverine habitats, 26 Jul 2001 MA 8400 (DEPO913, JEPS 99704).

Equisetaceae

Equisetum arvense L., locally common, riverine and palustrine wetlands, black cottonwood forest, mountain alder and willow thickets, 24 Jun 2001, MA 8182 (DEPO917, JEPS99702); *E. laevigatum* A. Braun, locally common, moist granitic gravels in Jeffrey pine - white fir forest, 15 Jul 2001, MA 8348 (DEPO918, JEPS99703, RM).

Pteridaceae

Aspidotis densa (Brack.) Lellinger, uncommon, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, MA 8259 (DEPO1127, JEPS99707, RM); *Cryptogramma acrostichoides* R.Br., occasional, east-facing granite outcrop in Jeffrey pine forest with scattered western juniper, 24 Jun 2001, MA 8214 (DEPO1128, JEPS99708); *Pellaea breweri* D.C. Eaton, uncommon, west-facing basalt outcrop in lodgepole pine forest, 25 Jul 2001, MA 8391 (DEPO1129, JEPS99709, RM).

Selaginellaceae

Selaginella watsonii Underw., local, granite outcrops, 29 Jul 2001, DEPO.0040.08 (DEPO1209).

Woodsiaaceae

Athyrium filix-femina (L.) Roth var. *cyclosorum* Rupr., occasional, black cottonwood forest, mountain alder and willow thickets, 15 Jul 2001, MA 8343 (DEPO914, JEPS99705, RM); *Cystopteris fragilis* (L.) Bernh., occasional, moist rock crevices, moist slope in mist of falls, 25 Jun 2001, MA 8225 (DEPO916, JEPS99706), 24 Jun 2001, MA 8178 (DEPO915, RM).

GYMNOSPERMS

Cupressaceae

Juniperus grandis R.P. Adams, occasional, steep east-facing slopes with sagebrush, huckleberry oak, and Jeffrey pine, 9 Jul 2001, MA 8478 (DEPO620, JEPS99749).

Pinaceae

Abies concolor (Gordon & Glend.) Lindl. ex Hildebr., abundant, red fir - white fir forest, lodgepole pine forest and woodland, with Jeffrey pine and huckleberry oak, 9 Jul 2001, MA 8485 (DEPO638, JEPS99931); *A. magnifica* A. Murray bis var. *magnifica*, abundant, in pure stands of red fir forest, mixed red fir - white fir forest, lodgepole pine forest, in mixed stands with Jeffrey pine, western white pine, 9 Jul 2001, MA 8481 (DEPO639, JEPS99932); *Pinus albicaulis* Engelm., uncommon, dry slope in lodgepole pine forest with red fir, 25 Jul 2001, MA 8385 (DEPO640, JEPS99933); *P. contorta* Douglas ex Loudon subsp. *murrayana* (Grev. & Balf.) Critchf., locally abundant, forms pure stands of forest and woodland; also occurs as a component of red fir - white fir forests on upland sites, and black cottonwood - mountain alder associations along the river, 9 Jul 2001, MA 8480 (DEPO641, JEPS99934); *P. jeffreyi* Grev. & Balf., common, forms open woodlands on exposed slopes, emergent from huckleberry oak shrublands, component of red fir - white fir, Jeffrey pine - red fir, and Jeffrey pine - white fir - red fir forests, 9 Jul 2001, MA 8486 (DEPO642, JEPS99935); *P. monticola* Douglas ex D. Don, local, component of red - fir western white pine forest, Jeffrey pine-huckleberry oak woodland; and Jeffrey pine - white fir - red fir forests, 9 Jul 2001, MA 8479 (DEPO643, JEPS99919); *Tsuga mertensiana* (Bong.) Carrière, uncommon, north-facing slope with red fir, 24 Jul 2001, MA 8367 (DEPO644).

EUDICOTS

Adoxaceae

Sambucus nigra L. subsp. *caerulea* (Raf.) Bolli, occasional, along banks of river, 28 Aug 1977, JLM 129 (DEPO507).

Apiaceae

Cymopterus terebinthinus (Hook.) Torr. & A. Gray var. *californicus* (J.M. Coult. & Rose) Jeps., local, top of rhyodacite cliffs in Jeffrey pine - lodgepole pine forest, 8 Jul 2001, MA 8473 (DEPO559, JEPS99800); *Heracleum maximum* W. Bartram, local, riparian, 28 Jul 2001, MA 8433 (DEPO560, JEPS99801); *Ligusticum*

grayi J.M. Coult. & Rose, local, moist areas in riparian understory, 18 Aug 2001, *MA 8476* (DEPO561, JEPS99802); *Lomatium torreyi* (J.M. Coult. & Rose) J.M. Coult. & Rose, uncommon, in vertical cracks of steep basalt column cliffs, 25 Jul 2001, *MA 8397* (DEPO562, JEPS99803); *Osmorhiza berteroi* DC., local, aspen grove, 23 Jun 2001, *MA 8165* (DEPO564), 20 Jun 2001, *MA 8064* (DEPO563, JEPS99804); *O. occidentalis* (Nutt.) Torr., uncommon, dry, loose pumice over sandy granitic soil near falls, 24 Jun 2001, *MA 8198* (DEPO565, JEPS99805); *Oxyopolis occidentalis* J.M. Coult. & Rose, uncommon, wet meadow; mountain alder and willow thickets, 29 Jul 2001, *MA 8461* (DEPO566, JEPS99806); *Perideridia parishii* (J.M. Coult. & Rose) A. Nelson & J.F. Macbr. subsp. *latifolia* (A. Gray) T.I. Chuang & Constance, common, seep in red fir - white fir forest, black cottonwood forest, mountain alder and willow thickets, wet meadow, 26 Jul 2001, *MA 8405* (DEPO567, JEPS99807); *Sium suave* Walter, uncommon, moist slope in Jeffrey pine - red fir forest in mucky, loamy sand, mountain alder thickets, 27 Jul 2001, *MA 8428* (DEPO570, JEPS99808); *Sphenosciadium capitellatum* A. Gray, occasional, wet meadows and streamsides, mountain alder thickets, moist areas in lodgepole pine and red fir forests, 24 Jun 2001, *MA 8223* (DEPO568, JEPS99809).

Apocynaceae

Apocynum androsaemifolium L., common, open slopes, dry understory of conifer forests, chaparral, 22 Jun 2001, *MA 8083* (DEPO571, JEPS99790).

Asteraceae

Achillea millefolium L., common, upland and wetland habitats, including conifer forest, riparian forests and shrublands, wet meadows, 24 Jun 2001, *MA 8217* (DEPO574, JEPS99791); *Ageratina occidentalis* (Hook.) R.M. King & H. Rob., local, basalt rocks near the postpiles, sagebrush and bitter cherry shrublands, 29 May 1977, *JLM* (DEPO108), 6 Aug 1977, *JN* (DEPO107, DEPO487); *Ageris* × *elata* (Nutt.) Greene (pro. sp.), local, mesic lodgepole pine forest, 29 Jul 2001, *MA 8454* (DEPO575); *A. monticola* Greene, occasional, dry terrace in lodgepole pine forest, 25 Jul 2001, *MA 8399* (DEPO576); *A. retrorsa* (Benth.) Greene, uncommon, Jeffrey pine - white fir forest, 22 Jun 2001, *MA 8081* (DEPO577, JEPS99792); *Anaphalis margaritacea* (L.) Benth. & Hook. f., common, riparian and upland habitats, understory of conifer forests, rock outcrops, 15 Jul 2001, *MA 8336* (DEPO578, JEPS99793); *Antennaria corymbosa* E.E. Nelson, uncommon, wet meadow and gravel bars, 27 Jun 2001, *MA 8272* (DEPO579, JEPS99794, RM); *A. rosea* Greene subsp. *confinis* (Greene) R.J. Bayer, common, lodgepole pine forest, red fir forest, wet meadows and seeps, 22 Jun 2001, *MA 8083* (DEPO571), 15 Jul 2001, *MA 8330* (DEPO802), 25 Jul 2001, *MA 8392* (JEPS99795); *Arnica chamissonis* Less., locally common, meadow edge adjacent to lodgepole pine forest, black cottonwood forest, mountain alder thickets, 28 Jul 2001, *MA 8437* (DEPO803, JEPS99796, RM); *A. mollis* Hook., locally common, moist slope in mist of falls, willow thickets, 25 Jun 2001, *MA 8234* (DEPO805), 5 Jul 2001, *MA 8324* (DEPO804, JEPS99797); *Artemisia douglasiana* Besser, locally abundant, mountain alder and willow

thickets, 28 Jul 2001, *MA 8434* (DEPO806, JEPS99798); *A. ludoviciana* Nutt. subsp. *incompta* (Nutt.) D.D. Keck, locally abundant, riparian habitats and meadow edges, 27 Jul 1977, *JLM* (DEPO94); *A. tridentata* Nutt. subsp. *vaseyana* (Rydb.) Beetle, uncommon, openings in lodgepole pine forest and Jeffrey pine forest, 9 Jul 2001, *MA 8483* (DEPO807, JEPS99799); *Chaenactis alpigena* Sharsm., uncommon, pumice slope in coniferous forest, 19 Aug 1978 *JLM* (DEPO694); *C. douglasii* (Hook.) Hook. & Arn. var. *douglasii*, locally abundant, sandy openings in coniferous forest, often on pumice, 22 Jun 2001, *MA 8114* (DEPO815), 22 Jun 2001, *MA 8080* (DEPO816, JEPS99785); *Cirsium andersonii* (A. Gray) Petr., local, post-burn Jeffrey pine - white fir forest, red fir - white fir forest, 22 Jun 2001, *MA 8077* (DEPO818, JEPS99787); *C. scariosum* Nutt., local, wet meadow and gravel bars, 27 Jun 2001, *MA 8274* (DEPO819, JEPS99788, RM); **C. vulgare* (Savi) Ten., native to Europe, locally common, granite outcrop near sag pond, mountain alder thickets, understory of coniferous forest, 27 Jul 2001, *MA 8423* (DEPO820); *Ericameria bloomeri* (A. Gray) J.F. Macbr., occasional, on dry pumice soil along river, lodgepole pine, red fir, and white fir forests, black cottonwood forest, mountain alder thickets, 16 Sep 1980, *SCM 244* (DEPO104), 17 Aug 1977, *JLM* (DEPO103); *E. nauseosa* (Pall. ex Pursh) G.L. Nesom & G.I. Baird var. *speciosa* (Nutt.) G.L. Nesom & G.I. Baird, occasional, sandy volcanic gravels in post-burn coniferous forest, 27 Jul 2001, *MA 8414* (DEPO817, JEPS99786, RM); *E. parryi* (A. Gray) G.L. Nesom & G.I. Baird var. *monocephala* (A. Nelson & P.B. Kenn.) G.L. Nesom & G.I. Baird, uncommon, basalt outcrop in lodgepole pine forest, 25 Jul 2001, *MA 8396* (DEPO572); *Erigeron breweri* A. Gray var. *breweri*, local, basalt outcrops, post-burn Jeffrey pine - white fir forest, 22 Jun 2001, *MA 8079* (DEPO809, JEPS99770), 27 Jul 2001, *MA 8411* (DEPO810, JEPS99789, RM); *E. coulteri* Porter, occasional, basalt outcrops in Jeffrey pine - red fir forest, 27 Jul 2001, *MA 8424* (DEPO821, JEPS99771); *E. elmeri* (Greene) Greene, occasional, Jeffrey pine forest, cliffs and rock outcrops, 24 Jun 2001, *MA 8215* (DEPO823); *E. glacialis* (Nutt.) A. Nelson var. *glacialis*, local, dry streambed, moist wash, and riparian habitat, 28 Jul 2001, *MA 8448* (DEPO824, JEPS99773), 24 Jun 2001, *MA 8218* (DEPO826, JEPS99772, RM), 22 Jun 2001, *MA 8286* (DEPO827); *E. glacialis* (Nutt.) A. Nelson var. *hirsutus* (Cronquist) G.L. Nesom, local, lodgepole pine forest, dry slopes near river, 3 Jul 2001, *MA 8313* (DEPO827, JEPS99774, RM), 24 Jun 2001, *MA 8193* (DEPO582); *E. lonchophyllus* Hook., uncommon, meadow edge adjacent to lodgepole pine forest, 28 Jul 2001, *MA 8438* (DEPO837, JEPS99733); *Eriophyllum lanatum* (Pursh) J. Forbes var. *integrifolium* (Hook.) Smiley, uncommon, dry slopes and benches in coniferous forest, 22 Jul 2001, *MA 8350* (DEPO583, JEPS99775); *Eucephalus breweri* (A. Gray) G.L. Nesom, occasional, open coniferous woodlands, 24 Jun 2001, *MA 8189* (DEPO808, JEPS99780); *Eurybia integrifolia* (Nutt.) G.L. Nesom, occasional, open coniferous forest, moist wash, 9 Nov 1980, *SCM 232* (DEPO96); *Gnaphalium palustre* Nutt., locally common, meadow and pond edges, 27 Jul 2001, *MA 8419* (DEPO588, JEPS99779), 25 Jul 2001, *MA 8368* (DEPO589); *Helenium bigelovii* A. Gray, occasional, sandy riparian soils, 28 Jul 2001, *MA 8431* (DEPO591, JEPS99760), 24 Jun 2001, *MA 8220* (DEPO590); *Hieracium albiflorum* Hook., abundant, understory of coniferous forest, mountain alder thickets, black cottonwood forest,

25 Jun 2001, *MA 8236* (DEPO592, JEPS99761); *H. horridum* Fr., common, basalt rock outcrops, granite cliffs, open pumice flats, 18 Jun 2001, *MA 8018* (DEPO593); ♀ *Hulsea brevifolia* A. Gray, common, in post-burn red fir forest with lodgepole pine, 26 Jul 2001, *MA 8401* (DEPO594), 24 Jun 2001, *MA 8192* (DEPO595, RM), 22 Jun 2001, *MA 8110* (DEPO596, JEPS99762); *H. vestita* A. Gray subsp. *vestita*, uncommon, red fir - white fir forest, exposed pumice, 26 Jul 1972 *KAH 184* (DEPO519); **Lactuca serriola* L., native to Europe, local, exposed loose pumice, 22 Aug 2001, *MA 8477* (DEPO597, JEPS99763); *Madia exigua* (Sm.) A. Gray, local, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8249* (DEPO600, JEPS99764); *Microseris nutans* (Hook.) Sch. Bip., local, loose pumice in red fir - white fir forest, Jeffrey pine woodland, lodgepole pine forest, 5 Jul 2001, *MA 8328* (DEPO601, JEPS99766), 24 Jun 2001, *MA 8190* (DEPO602, RM), 18 Jun 2001, *MA 8033* (DEPO603, JEPS99765); *Packeria cana* (Hook.) W.A. Weber & Á. Löve, local, basalt outcrop at top of postpile formation, 10 Jul 1977, *JLM* (DEPO110), 3 Jul 1980, *SCM 114* (DEPO111); *Pseudognaphalium californicum* (DC.) Anderb., occasional, loose pumice over sand, 8 Jul 2001, *MA 8474* (DEPO584, JEPS99776); *P. thermale* (E.E. Nelson) G.L. Nesom, common, post-burn red fir - white fir forest, riverbed and gullies, 26 Jul 2001, *MA 8409* (DEPO586, JEPS99777), 9 Jul 2001, *MA 8482* (DEPO585, JEPS99778, RM); *Senecio integerrimus* Nutt. var. *exaltatus* (Nutt.) Cronquist, common, dry north-facing slopes near river, 24 Jun 2001, *MA 8191* (DEPO604, JEPS99767); *S. scorzonella* Greene, uncommon, wet meadow and gravel bars, 27 Jun 2001, *MA 8271* (DEPO828, JEPS99768); *S. triangularis* Hook., locally abundant, black cottonwood forest, mountain alder and willow thickets, damp places in understory of coniferous forest, 20 Jun 2001, *MA 8068* (DEPO829, JEPS99769); *Solidago elongata* Nutt., locally abundant, black cottonwood forest, aspen grove; mountain alder and willow thickets, wet meadow, 15 Jul 2001, *MA 8337* (DEPO830, JEPS99730); *Stephanomeria tenuifolia* (Torr.) H.M. Hall, abundant, rocky outcrops, understory of fir forest with well-developed duff as well as post-burn, 3 Jul 2001, *MA 8321* (DEPO831, JEPS99731, RM); *Symphytotrichum bracteolatum* (Nutt.) G.L. Nesom, uncommon, aspen grove: base of cliffs adjacent to river, 18 Aug 2001, *MA 8475* (DEPO812, JEPS99781, RM); *S. foliaceum* (Lindl. ex DC.) G.L. Nesom var. *parryi* (D.C. Eaton) G.L. Nesom, uncommon, moist slopes, 27 Jul 2001, *MA 8426* (DEPO813, JEPS99783, RM); *S. spathulatum* (Lindl.) G.L. Nesom var. *spathulatum*, occasional, wet meadow; willow thickets, 29 Jul 2001, *MA 8453* (DEPO814, JEPS99784); **Taraxacum officinale* F.H. Wigg., native to Europe, local, moist riparian areas, wet meadow, 3 Jul 2001, *MA 8287* (RM), 27 Jun 2001 *MA 8281* (JEPS99732), 23 Jun 2001, *MA 8154* (DEPO835); **Tragopogon dubius* Scop., native to Europe, uncommon, post-burn coniferous forest, 22 Jun 2001, *MA 8089* (DEPO836); *Wyethia mollis* A. Gray, occasional, post-burn Jeffrey pine - white fir forest, 22 Jun 2001, *MA 8078* (DEPO838, JEPS99734).

Betulaceae

Alnus incana (L.) Moench subsp. *tenuifolia* (Nutt.) Breitung, common, forming dense thickets along riparian corridor, forming understory of black cotton-

wood forest, 20 Jun 2001, *MA 8076* (DEPO839, JEPS99746).

Boraginaceae

Cryptantha affinis (A. Gray) Greene, locally common, moist areas in red fir forest and red fir - white fir forest, 26 Jul 2001 *MA 8410* (DEPO843, JEPS99735, RM), 22 Jun 2001, *MA 8095* (DEPO842); *C. echinella* Greene, locally common, dry areas in lodgepole pine forest, red fir - white fir forest, 3 Jul 2001, *MA 8318* (DEPO845); *C. torreyana* (A. Gray) Greene, locally common, in dry area at meadow edge under lodgepole pine, 4 Aug 1980, *SCM 186* (DEPO120); *Hackelia micrantha* (Eastw.) J.L. Gentry, local, moist areas in red fir - white fir forest, streambanks in mountain alder thickets and black cottonwood forest, 22 Jun 2001, *MA 8104* (DEPO846, JEPS99736); *H. mundula* (Jeps.) Ferris, occasional, openings in dry coniferous forest, 27 Jul 2001, *MA 8422* (DEPO848), 20 Jun 2001, *MA 8053* (DEPO847, JEPS99737, RM); *H. velutina* (Piper) I.M. Johnst., occasional, rocky slope in riparian habitat, 7 Jun 1980, *SCM 128* (DEPO122); *Hesperochiron pumilus* (Griseb.) Porter, uncommon, wet meadow edge, 3 Jul 1980, *SCM 109* (DEPO140); *Nemophila spatulata* Coville, local, wet meadow; mountain alder thickets, 23 Jun 2001, *MA 8129* (DEPO962, JEPS99647); *Phacelia eisenii* Brandege, uncommon, moist slope in mist of falls, 25 Jun 2001, *MA 8233* (DEPO963, JEPS99648); *P. hastata* Douglas ex Lehm. var. *compacta* (Brand) Cronquist, common, sandy benches and outcrops in Jeffrey pine - white fir forest, red fir - western white pine forest, 20 Jun 2001, *MA 8067* (DEPO964, JEPS99649); *P. hydrophyloides* A. Gray, uncommon, lodgepole pine forest, red fir forest, 3 Jul 2001, *MA 8306* (DEPO965); *P. mutabilis* Greene, occasional, Jeffrey pine - white fir forest, lodgepole pine forest, 20 Jun 2001, *MA 8051* (DEPO966); *Plagiobothrys hispidulus* (Greene) I.M. Johnst., locally common, moist to dry meadows, openings in Jeffrey pine - white fir forest, lodgepole pine forest, 30 Jul 2001, *MA 8469* (DEPO853), 25 Jul 2001, *MA 8381* (RM), 25 Jun 2001, *MA 8238* (RM), 22 Jun 2001, *MA 8097* (DEPO849, JEPS99817), 22 Jun 2001, *MA 8096* (JEPS99738), 18 Jun 2001, *MA 8042* (DEPO854); *P. hispidus* A. Gray, uncommon, post-burn coniferous forest in loose pumice; lodgepole pine forest, 3 Jul 2001, *MA 8317* (DEPO841), 3 Jul 2001, *MA 8322* (DEPO840, JEPS99751).

Brassicaceae

Barbarea orthoceras Ledeb., local, moist slope in mist of falls, streambanks, 25 Jun 2001, *MA 8231* (DEPO867, JEPS99757, RM), 25 Jun 2001, *MA 8235* (DEPO1141, JEPS99859); *Boechera divaricarpa* (A. Nelson [pro. sp.]) Á. Löve & D. Löve, common, moist sands and gravels, 3 Jul 2001, *MA 8295* (DEPO864, JEPS99755), 18 Jun 2001, *MA 8020* (DEPO856, JEPS99756); *B. howellii* (S. Watson) Windham & Al-Shehbaz, common, lodgepole pine forest, 18 Jun 2001, *MA 8015* (DEPO861, JEPS99754); *B. pinetorum* (Tidest.) Windham & Al-Shehbaz, uncommon, rock outcrops, wet meadow; lodgepole pine forest, 25 Jul 2001, *MA 8375* (DEPO858, JEPS99752, RM), 23 Jun 2001, *MA 8122* (DEPO1176, JEPS99842); *B. rectissima* (Greene) Al-Shehbaz, common, rock outcrops in

conifer forest, 7 Jun 1980, *SCM 130* (DEPO123), 15 Jun 1972 *KAH 136* (DEPO21); *B. repanda* (S. Watson) Al-Shehbaz, common, rock outcrops, conifer forest, 20 Jun 2001, *MA 8047* (DEPO863, JEPS99818), 18 Jun 2001, *MA 8035* (DEPO862); *B. retrofracta* (Graham) Å. Löve & D. Löve, common, rock outcrops, red fir forest, red fir - white fir forest, Jeffrey pine woodland; sagebrush scrub, 22 Jun 2001, *MA 8111* (DEPO859), 20 Jun 2001, *MA 8069* (DEPO860); *Cardamine breweri* S. Watson, uncommon, mountain alder and willow thickets, 28 Jul 2001, *MA 8432* (DEPO868, JEPS99758); *Descurainia incana* (Bernh. ex Fisch. & C.A. Mey.) Dorn, uncommon, shaded Jeffrey pine - red fir forest, mountain alder and willow thickets, 226 Jun 2001, *MA 8266* (DEPO870, JEPS99819), 3 Jun 2001, *MA 8150* (DEPO869, RM); *Draba albertina* Greene, local, wet meadow; riparian, 23 Jun 2001, *MA 8125* (DEPO871); *Erysimum perenne* (S. Watson ex Coville) Abrams, common, dry understory of coniferous forest, 22 Jun 2001, *MA 8113* (DEPO872, JEPS99759); *Lepidium densiflorum* Schrad., uncommon, on landslide near river, 9 Jul 2001, *MA 8484* (DEPO873); *Nasturtium officinale* W.T. Aiton, locally common, stream courses, riparian, 22 Jul 2001, *MA 8358* (DEPO878, JEPS99825); *Phoenicaulis cheiranthoides* Nutt., uncommon, basalt outcrops, 8 Jun 2001, *MA 8472* (DEPO874, JEPS99739); *Rorippa curvipes* Greene var. *curvipes*, uncommon, wet meadows and gravel bars, 27 Jul 2001, *DEPO.0036.12* (DEPO1208); *R. curvisiliqua* (Hook.) Bessey ex Britton, local, wet meadow; willow thickets, 25 Jul 2001, *MA 8382* (DEPO877), 27 Jun 2001, *MA 8279* (DEPO875, JEPS99750); *Streptanthus tortuosus* Kellogg, common, rocky to sandy soils in understory of coniferous forest, riparian forest, chaparral, 20 Jun 2001, *MA 8048* (DEPO605, JEPS99740).

Caprifoliaceae

Lonicera conjugalialis Kellogg, common, lodgepole pine forest, red fir - white fir forest, 3 Jul 2001, *MA 8305* (DEPO607, RM), 18 Jun 2001, *MA 8013* (DEPO606, JEPS99741); *L. involucrata* (Richardson) Banks ex Spreng. var. *involucrata*, local, riparian areas, moist places in lodgepole pine forest, 3 Jul 2001, *MA 8304* (DEPO608, JEPS); *Symphoricarpos mollis* Nutt., uncommon, Jeffrey pine - white fir forest, 28 Jul 2001, *MA 8450* (DEPO609, JEPS); *S. rotundifolius* A. Gray var. *rotundifolius*, occasional, Jeffrey pine - white fir - red fir forest, sagebrush shrubland; bitter cherry shrubland, 24 Jun 2001, *MA 8177* (DEPO610, JEPS99742).

Caryophyllaceae

Sagina saginoides (L.) H. Karst., locally common, wet meadow; riparian, 23 Jun 2001, *MA 8132* (DEPO611, JEPS99744); *Silene menziesii* Hook., uncommon, black cottonwood forest, mountain alder thickets, 28 Jul 2001, *DEPO.0018.06* (DEPO1210); **Spergularia rubra* (L.) J.S. Presl & C. Presl., native to Europe, occasional, wet meadow and gravel bars, 27 Jun 2001, *MA 8273* (DEPO612, JEPS99815); *Stellaria longipes* Goldie subsp. *longipes*, local, wet meadow and streambanks, 28 Jul 2001, *MA 8442* (DEPO615), 23 Jun 2001, *MA 8137* (DEPO614, JEPS99814); *S. umbellata* Turcz. ex Kar. & Kir., local, wet meadow; aspen grove, 23 Jun

2001 *MA 8167* (DEPO616, JEPS99745), 23 Jun 2001, *MA 8151* (DEPO617, RM).

Cornaceae

Cornus sericea L. subsp. *sericea*, locally common, moist places near river, 24 Jun 2001, *MA 8188* (DEPO618, JEPS99747).

Crassulaceae

Sedum obtusatum A. Gray subsp. *obtusatum*, uncommon, rock outcrops, 5 Jul 2001, *MA 8329* (DEPO619, JEPS99748).

Ericaceae

Arctostaphylos nevadensis A. Gray, uncommon, Jeffrey pine - white fir forest, 20 Jun 2001, *MA 8055* (DEPO919, JEPS99664); *A. patula* Greene, locally common, red fir - white fir forest, Jeffrey pine woodland; bitter cherry shrubland, 22 Jun 2001, *MA 8091* (DEPO921, JEPS99665, RM); *Rhododendron columbianum* (Piper) Harmaja, uncommon, mesic lodgepole pine forest, 3 Jul 2001, *MA 8312* (DEPO922, JEPS99666); *Pterospora andromedea* Nutt., occasional, red fir - white fir forest, 26 Jul 2001, *MA 8403* (DEPO923); *Pyrola picta* Sm., occasional, lodgepole pine forest, 25 Jun 2001, *MA 8237* (DEPO924); *Sarcodes sanguinea* Torr., occasional, lodgepole pine forest, Jeffrey pine forest, 18 Jun 2001, *MA 8012* (DEPO930, JEPS99667).

Fabaceae

Acmispon americanus (Nutt.) Rydb. var. *americanus*, locally common, Jeffrey pine - white fir forest, lodgepole pine forest, moist slope in mist of falls, 28 Jul 2001, *MA 8449* (DEPO935), 25 Jun 2001, *MA 8227* (DEPO934, RM); *Hosackia crassifolia* Benth. var. *crassifolia*, locally common, Chaparral, 27 Jul 2001, *MA 8417* (DEPO932, JEPS99668); *H. oblongifolia* Benth. var. *oblongifolia*, uncommon, moist area in Jeffrey pine - red fir forest, 27 Jul 2001, *MA 8427* (DEPO933, JEPS99669); *Lupinus albicaulis* Douglas ex Hook., locally common, dry understory of Jeffrey pine - white fir - red fir forest, 28 Jul 2001, *MA 8452* (DEPO938, RM), 24 Jun 2001, *MA 8197* (DEPO937, JEPS99671); *L. latifolius* J. Agardh var. *columbianus* (A. A. Heller) C.P. Sm., locally common, moist drainages, aspen grove, 22 Jun 2001, *MA 8102* (DEPO939, JEPS99821); *L. lepidus* Douglas ex Lindl. var. *sellulus* (Kellogg) Barneby, locally common, intermittent stream course and surrounding meadow, 23 Jun 2001, *MA 8117* (DEPO940, JEPS99652); *L. polyphyllus* Lindl. var. *burkei* (S. Watson) C.L. Hitchc., common, aspen grove; black cottonwood forest, willow thickets, wet meadow; gravel bars, 27 Jun 2001, *MA 8270* (DEPO942, JEPS99655), 26 Jun 2001, *MA 8290* (DEPO944, JEPS99654), 23 Jun 2001, *MA 8162* (DEPO941, RM), 20 Jun 2001, *MA 8070* (DEPO943, JEPS99654, RM); *Trifolium cyathiferum* Lindl., locally common, moist seeps, 26 Jun 2001, *MA 8246* (DEPO945, JEPS99811); *T. longipes* Nutt. subsp. *hansenii* (Greene) J.M. Gillett, locally common, wet meadow; riparian forest, willow thickets, 23 Jun 2001, *MA 8166* (DEPO946, JEPS99656); *T. monanthum* A.

Gray subsp. *monanthum*, locally common, wet meadow; riparian forest, willow thickets, 23 Jun 2001, *MA 8131* (DEPO948), 22 Jun 2001, *MA 8093* (DEPO931, JEPS99657, RM); *T. wormskioldii* Lehm., local, wet meadow edge, 28 Jul 2001, *MA 8436* (DEPO949, JEPS99658).

Fagaceae

Chrysolepis sempervirens (Kellogg) Hjelmq., uncommon, west-facing Jeffrey pine - white fir forest, 29 Jul 2001, *MA 8463* (DEPO950, JEPS99659, RM); *Quercus vaccinifolia* Kellogg, locally common, Jeffrey pine - white fir - red fir forest, Jeffrey pine woodland; sagebrush shrubland, 9 Jul 2001, *MA 8487* (DEPO951, JEPS99660).

Gentianaceae

Frasera speciosa Douglas ex Griseb., uncommon, Jeffrey pine - white fir forest, 28 Jul 2001, *MA 8429* (DEPO953, JEPS99810); *Gentianopsis holopetala* (A. Gray) Iltis, uncommon, wet meadow, 22 Aug 1977, *JLM* (DEPO517), 3 Aug 1972 *KAH 200* (DEPO33); *G. simplex* (A. Gray) Iltis, uncommon, wet meadow; mountain alder and willow thickets, 29 Jul 2001, *MA 8460* (DEPO952, JEPS99661).

Geraniaceae

Geranium richardsonii Fisch. & Trautv., local, black cottonwood forest, aspen grove; mountain alder thicket, 23 Jun 2001, *MA 8161* (DEPO954, JEPS99642).

Grossulariaceae

Ribes cereum Douglas var. *cereum*, common, Jeffrey pine - white fir forest, lodgepole pine forest, 24 Jun 2001, *MA 8199* (DEPO955, JEPS99938), 20 Jun 2001, *MA 8054* (DEPO956, JEPS99643); *R. inerme* Rydb. var. *inerme*, common, riparian; willow thickets, 15 Jul 2001, *MA 8339* (DEPO957, JEPS99644); *R. nevadense* Kellogg, occasional, riparian; red fir - white fir forest, Jeffrey pine - white fir forest, 15 Jul 2001, *MA 8341* (DEPO960, JEPS99645), 24 Jun 2001, *MA 8186* (DEPO959, RM); *R. roezlii* Regel var. *roezlii*, common, red fir - white fir forest, lodgepole pine forest, Jeffrey pine - white fir forest, mountain alder thickets, 20 Jun 2001, *MA 8065* (DEPO961, JEPS99646), 03 Jul 1980, *SM 117* (DEPO779), 15 Jun 1972 *KAH 137* (DEPO958); *R. viscosissimum* Pursh, occasional, moist areas in coniferous forest, 27 Jul 2001, *DEPO.0026.17* (DEPO1207).

Hypericaceae

Hypericum anagaloides Cham. & Schldl, locally common, riparian; wet meadow, 05 Jul 2001, *MA 8327* (DEPO968, RM), 23 Jun 2001, *MA 8130* (DEPO967); *H. scouleri* Hook., uncommon, river bank, 27 Aug 1983 *JLM* (DEPO144).

Lamiaceae

Agastache urticifolia (Benth.) Kuntze, occasional, mountain alder and willow thickets, 3 Jul 2001, *MA 8289* (DEPO987, JEPS99641), 26 Jun 2001, *MA 8263*

(DEPO988, JEPS); *Monardella odoratissima* Benth. subsp. *pallida* (A. Heiler) Epling, common, bitter cherry shrubland; open slopes, 24 Jun 2001, *MA 8195* (DEPO989, JEPS99622); *Stachys albens* A. Gray, locally common, riparian forest, mountain alder and willow thickets, 22 Jul 2001, *MA 8359* (DEPO990, JEPS99623).

Loasaceae

Mentzelia dispersa S. Watson, common, dry open slopes, Jeffrey pine - red fir forest, 22 Jun 2001, *MA 8090* (DEPO1007, JEPS99631, RM), 18 Jun 2001, *MA 8034* (DEPO1006).

Montiaceae

Calyptridium monospermum Greene, locally common, sandy soils in lodgepole pine forest, Jeffrey pine - white fir - red fir forest, 24 Jun 2001, *MA 8221* (DEPO1118, JEPS99885, RM); *C. umbellatum* (Torr.) Greene, local, exposed dry pumice, 2 Jul 1980, *SCM 108* (DEPO212), 30 Jun 1972 *KAH 160* (DEPO51); *Claytonia rubra* (Howell) Tidestr. subsp. *rubra*, uncommon, moist slope in mist of falls, 25 Jun 2001, *MA 8224* (DEPO1119, JEPS99886); *Lewisia nevadensis* (A. Gray) B.L. Rob., uncommon, wet meadow, 19 Jul 1980, *SCM 140* (DEPO215), 23 Jun 1980, *SCM 102* (DEPO214); *L. triphylla* (S. Watson) B.L. Rob., uncommon, granitic seep, 18 Jun 2001, *MA 8031* (DEPO1120); *Montia chamissoi* (Spreng.) Greene, uncommon, mountain alder and willow thickets, granitic seeps, meadow edge, 03 Jul 2001, *MA 8283* (DEPO1123, JEPS99887), 23 Jun 2001, *MA 8138* (DEPO1121, RM), 23 Jun 2001, *MA 8136* (DEPO1122, JEPS99888), 18 Jun 2001, *MA 8032* (DEPO1124).

Onagraceae

Chamerion angustifolium (L.) Holub subsp. *circumvagum* (Mosquin) Hoch, locally common, moist open places, gravel bars, mountain alder thickets, 15 Jul 2001, *MA 8335* (DEPO1010, JEPS99614), 4 Sep 1980, *SM 224* (DEPO701), 25 Jul 1972 *KH 175* (DEPO551); *Circaea alpina* L. subsp. *pacifica* (Asch. & Magnus) Raven, locally common, moist swales, mountain alder thickets, 24 Jun 2001, *MA 8202* (DEPO1008, JEPS99612); *Epilobium anagallidifolium* Lam., local, moist seeps, mountain alder thickets, 20 Jun 2001, *MA 8052* (DEPO1009, JEPS99613); *E. brachycarpum* C. Presl, locally common, in post-burned coniferous forest, dry sands, gravels in Jeffrey pine forest with scattered western juniper; slope of flaky rhyodacite below falls, 28 Jul 2001, *MA 8446* (DEPO1015, JEPS99615), 27 Jul 2001, *MA 8415* (DEPO1012, RM), 24 Jun 2001, *MA 8211* (DEPO11, JEPS99616, RM); *E. canum* (Greene) Raven subsp. *latifolium* (Hook.) Raven, uncommon, exposed cliffs and rocky outcrops, 29 Jul 2001, *MA 8458* (DEPO1016, JEPS99617); *E. ciliatum* Raf. subsp. *ciliatum*, locally common, wet meadow edge, willow thickets, 25 Jul 2001, *MA 8379* (DEPO1017, JEPS99618), 26 Jun 2001, *MA 8264* (DEPO1018); *E. ciliatum* Raf. subsp. *glandulosum* (Lehm.) P. Hoch & Raven, common, mountain alder thickets, moist swales in coniferous forest, 28 Jul 2001, *MA 8447* (DEPO1021, JEPS99621, RM), 22 Jul 2001, *MA 8360* (DEPO1019, JEPS99619, RM), 20 Jun 2001, *MA 8062* (DEPO1020,

JEPS99620); *E. glaberrimum* Barbey subsp. *fastigiatum* (Nutt.) P. Hoch & Raven, local, moist areas, red fir forest, 3 Jul 2001, *MA 8311* (DEPO1022, JEPS99602); *E. glaberrimum* subsp. *glaberrimum*, locally common, on landslide near river, 26 Jun 2001, *MA 8265* (DEPO1023, JEPS99603); *E. hallianum* Hausskn., locally common, wet meadow, streambanks, 26 Jul 2001, *MA 8408* (DEPO1031, RM), 25 Jul 2001, *MA 8378* (DEPO1024, JEPS99604), 23 Jun 2001, *MA 8141* (DEPO1026), 23 Jun 2001, *MA 8118* (DEPO1027, RM), 22 Jun 2001, *MA 8098* (DEPO1028), 22 Jun 2001, *MA 8101* (DEPO1030, JEPS99937), 20 Jun 2001, *MA 8063* (DEPO1032); *E. hornemannii* Reichb. subsp. *hornemannii*, uncommon, moist riverbank, 4 Aug 1980, *SCM 191* (DEPO704); *E. lactiflorum* Hausskn., uncommon, moist riverbank, 28 Jul 2001, *DEPO. 0018.19* (DEPO1202); *Gayophytum decipiens* F.H. Lewis & JSzweyk., occasional, lodgepole pine forest, Jeffrey pine - white fir - red fir forest, black cottonwood forest, mountain alder thickets, 22 Jun 2001, *MA 8115* (DEPO1034, JEPS99605, RM); *G. diffusum* Torr. & A. Gray subsp. *parviflorum* F.H. Lewis & JSzweyk., abundant, red fir - white fir forest, mountain alder thickets, lodgepole pine forest, 23 Jun 2001, *MA 8142* (DEPO1037), 22 Jun 2001, *MA 8099* (DEPO1035, JEPS99936), 16 Sep 1980, *SCM 247* (DEPO158), 19 Jul 1980, *SCM 145* (DEPO157), 25 Jul 1977, *JLM* (DEPO698); *G. heterozygum* F.H. Lewis & JSzweyk., local, lodgepole pine forest, red fir forest, Jeffrey pine forest, 22 Jul 2001, *MA 8353* (DEPO1038, JEPS99606), 22 Jul 2001, *MA 8354* (DEPO1039, RM); *G. humile* A.L. Juss., common, lodgepole pine forest, basalt outcrop; white fir forest, 26 Jun 2001, *MA 8247* (DEPO1040, RM), 22 Jun 2001, *MA 8100* (DEPO1041, JEPS99607), 18 Jun 2001, *MA 8023* (DEPO1042); *G. racemosum* Torr. & A. Gray, common, margin of sag pond, 27 Jul 2001, *MA 8418* (DEPO1043, JEPS99608).

Orobanchaceae

Castilleja applegatei Fernald subsp. *pinetorum* (Fernald) T.I. Chuang & Heckard, common, Jeffrey pine forest, shrubby, rocky hillsides, Jeffrey pine - red fir forest, 24 Jun 2001, *MA 8187* (DEPO652), 23 Jun 2001, *MA 8152* (DEPO653, JEPS99829); *C. miniata* Hook. subsp. *miniata*, occasional, mountain alder and willow thickets, 3 Jul 2001, *MA 8285* (DEPO654, JEPS99830), 25 Jul 1980, *SCM 166* (DEPO783), 25 Jun 1972 *KAH 155* (DEPO969); *C. peirsonii* Eastw., local, sagebrush scrub, 29 Jul 2001, *DEPO.0062.02* (DEPO1200); *C. tenuis* (Heller) T.I. Chuang & Heckard, local, aspen grove; basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8250* (DEPO1186, JEPS99831), 23 Jun 2001, *MA 8176* (DEPO1185, RM); *Orobancha fasciculata* Nutt., uncommon, loose pumice in burned forest, 3 Jul 2001, *MA 8320* (DEPO637, JEPS99930), 29 Aug 1980, *JLM* (DEPO165); *Pedicularis attollens* A. Gray, uncommon, wet meadow, 25 Jul 1980, *SCM 170* (DEPO253), 28 Jul 1972 *KAH 195* (DEPO74); *P. semibarbata* A. Gray, common, red fir - white fir forest, Jeffrey pine - white fir - red fir forest, mountain hemlock forest, 22 Jun 2001, *MA 8084* (DEPO670, JEPS99694).

Phrymaceae

Mimulus breweri (Greene) Coville, locally common, white fir forest, moist drainage near buttresses, 26 Jun

2001, *MA 8239* (DEPO1191, JEPS99834), 22 Jun 2001, *MA 8092* (DEPO1190); *M. guttatus* Fisch. ex DC., common, wet places, aspen grove, mountain alder thickets, black cottonwood forest, moist slope in mist of falls, basalt outcrop and associated seep in white fir forest, 25 Jun 2001, *MA 8230* (DEPO1193), 26 Jun 2001, *MA 8240* (DEPO1192, JEPS99835), 23 Jun 2001, *MA 8158* (DEPO1194, RM), 3 Jul 1980, *SCM 112* (DEPO789); *M. laciniatus* A. Gray, local, seeps on granite outcrops, 3 Jul 2001, *MA 8309* (DEPO662, RM), 18 Jun 2001, *MA 8026* (DEPO661, JEPS99836); *M. leptaleus* A. Gray, local, moist pumice slope, 4 Jul 1980, *SCM 123* (DEPO788), 15 Jul 1978 *JLM* (DEPO786); *M. lewisii* Pursh, local, streambanks and seeps, mountain alder thickets, black cottonwood forest, 20 Jun 2001, *MA 8059* (DEPO663, JEPS99837), 1 Jul 1977, *JLM* (DEPO786); *M. moschatus* Lindl., locally common, seeps and streambanks, 26 Jun 2001, *MA 8241* (DEPO668, RM), 23 Jun 2001, *MA 8159* (DEPO664, JEPS99838), 20 Jun 2001, *MA 8061* (DEPO667), 20 Jul 1980, *SCM 158* (DEPO790); *M. pilosus* (Benth.) S. Watson, uncommon, dry east-facing slope, 27 Aug 1980, *SCM and JLM 212* (DEPO791); *M. primuloides* Benth., locally common, wet meadows, willow thickets, 23 Jun 2001, *MA 8128* (DEPO669, JEPS99692), 3 Jul 1980, *SCM 111* (DEPO792), 18 Jun 1972, *KAH 151* (DEPO991); *M. tilingii* Regel, locally common, seeps and moist outcrops, 20 Jun 2001, *MA 8060* (DEPO1195, JEPS99693, RM), 20 Jul 1980, *SCM 165* (DEPO793), 18 Jun 1972 *KAH 152* (DEPO1002).

Plantaginaceae

Collinsia parviflora Douglas ex Lindl., locally common, moist shady places, 23 Jun 2001, *MA 8127* (DEPO1187, JEPS99832), 1 Jul 1980, *SCM 105* (DEPO237), 18 Jun 1972 *KAH 146* (DEPO67); *C. torreyi* A. Gray var. *wrightii* (S. Watson) I.M. Johnst., locally common, conifer forest, moist bench of large granitic outcrop, 20 Jun 2001, *MA 8057* (DEPO1188); *Penstemon azureus* Benth. var. *azureus*, local, granite outcrop in moist shady pocket, Jeffrey pine forest, 24 Jun 2001, *MA 8213* (DEPO672, JEPS99696, RM), 18 Jun 2001, *MA 8043* (DEPO671, JEPS99695), 26 Jul 1972, *KAH 193* (DEPO1014); *P. heterodoxus* A. Gray var. *cephalophorus* (Greene) N.H. Holmgren, locally common, wet meadows and drainages, lodgepole pine forest, 24 Jun 2001, *MA 8203* (DEPO673, JEPS99697); *P. laetus* A. Gray var. *laetus*, occasional, on pumice and basalt slope; basalt cliffs, 19 Jul 1980, *SCM 146* (DEPO800), 27 Jul 1977, *JLM* (DEPO799); *P. newberryi* A. Gray var. *newberryi*, common, red fir forest, Jeffrey pine - white fir - red fir forest, red fir - western white pine forest, 23 Jun 2001, *MA 8147* (DEPO674, JEPS), 3 Jul 1980, *SCM 113* (DEPO801), 30 Jun 1972, *KAH 161* (DEPO1036); *P. rostriflorus* A. Gray, occasional, rock outcrops, Jeffrey pine - red fir forest, bitter cherry shrubland, 22 Jun 2001, *MA 8082* (DEPO675, JEPS99698); *P. rydbergii* A. Nelson var. *oreocharis* (Greene) N.H. Holmgren, locally common, wet meadow; willow thickets, 27 Jun 2001, *MA 8269* (DEPO676, JEPS99699); *Veronica americana* (Raf.) Schwein. ex Benth., locally common, mountain alder and willow thickets, black cottonwood forest, aspen grove, 23 Jun 2001, *MA 8134* (DEPO678, JEPS99700), 28 Aug 1977, *JLM* (DEPO535); *V. serpyllifolia* L. subsp. *humifusa* (Dickson) Syme, locally common, gravel beds, willow thickets, 23 Jun 2001, *MA 8135*

(DEPO680, RM), 20 Jun 2001, *MA 8058* (DEPO679, JEPS99701), 28 Aug 1977, *JLM* (DEPO536); *V. wormskjöldii* Roem. & Schult., locally common, sandbars and wet meadows, 26 Jun 1977, *JLM and JN* (DEPO534), 14 Jun 1972, *KAH 132* (DEPO1052).

Polemoniaceae

Allophyllum gilioides (Benth.) A.D. Grant & V.E. Grant subsp. *violaceum* (A. Heller) A.G. Day, uncommon, on landslide near river, 26 Jun 2001, *MA 8267* (DEPO1090, JEPS99905, RM); *A. integrifolium* (Brand) A.D. Grant & V.E. Grant, locally common, basalt outcrop and associated seep in white fir forest, red fir - white fir forest, 26 Jul 2001, *MA 8404* (DEPO1091, JEPS99906), 26 Jun 2001, *MA 8253* (DEPO1092, JEPS99889, RM); *Collomia linearis* Nutt., locally abundant, moist understory of red fir - white fir forest, mountain alder and willow thickets, wet meadow, 3 Jul 2001, *MA 8296* (DEPO1094), 23 Jun 2001, *MA 8140* (DEPO1093, JEPS99890, RM), 4 Aug 1980, *SLM 194* (DEPO193); *C. tinctoria* Kellogg, common, moist slope in mist of falls, mountain alder thickets, aspen grove; black cottonwood forest, 25 Jun 2001, *MA 8326* (DEPO1095); *Ipomopsis aggregata* (Pursh) V.E. Grant subsp. *aggregata*, locally common, Jeffrey pine - white fir - red fir forest, 28 Jul 2001, *MA 8451* (DEPO1097, JEPS99892), 5 Aug 1980, *SCM 201* (DEPO196), 9 Jul 1972 *KAH 169* (DEPO45); *Navarretia capillaris* (Kellogg) Kuntze, uncommon, granitic seep, 18 Jun 2001, *MA 8044* (DEPO1096, JEPS99891); *N. leptalea* (A. Gray) L.A. Johnson, local, moist pumice, 20 Jul 1980, *SCM 162* (DEPO195), 15 Jul 1978 *JLM* (DEPO194); *Linanthus pungens* (Torr.) J.M. Porter & L.A. Johnson, common, rock outcrops, north-facing shaded slope in Jeffrey pine - red fir forest, 23 Jun 2001, *MA 8148* (DEPO1100, JEPS99893); *Leptosiphon ciliatus* (Benth.) Jeps., common, loose pumice, 22 Jun 2001, *MA 8109* (DEPO1101, JEPS99894), 23 Jun 1980, *SCM 103* (DEPO199), 18 Jun 1972, *KAH 145* (DEPO47); *Microsteris gracilis* (Hook.) Greene, occasional, moist areas, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8254* (DEPO1102, JEPS99895, RM), 3 Jun 2001, *MA 8133* (DEPO1103); *Polemonium occidentale* Greene, uncommon, mountain alder and willow thickets, 28 Jul 2001, *MA 8430* (DEPO1104), 25 Jul 1980, *SCM 182* (DEPO200).

Polygonaceae

Bistorta bistortoides (Pursh) Small, locally common, wet meadows, gravel bars along river, 27 Jun 2001, *MA 8280* (DEPO1111, JEPS99881), 25 Jul 1980, *SCM 171* (DEPO753), 4 Jul 1980 *SCM 124* (DEPO752), 20 Jul 1972, *KAH 174* (DEPO599); *Eriogonum nudum* Benth. var. *deductum* (Greene) Jeps., abundant, mesic lodgepole pine forest, red fir forest, black cottonwood forest, mountain hemlock forest, mountain alder thickets, 20 Jun 2001, *MA 8049* (DEPO1105, JEPS99896); *E. nudum* var. *nudum*, abundant, dry to moist pumice, 4 Sep 1980, *SCM 223* (DEPO748), 20 Jul 1980, *SCM 153* (DEPO747), 30 Jun 1972, *KAH 163* (DEPO822); *E. spergulinum* A. Gray var. *reddingianum* (M.E. Jones) J.T. Howell, abundant, rocky basalt outcrops, lodgepole pine forest, black cottonwood forest, 18 Jun 2001, *MA 8014* (DEPO1106, JEPS99897), 2 Aug 1977, *JLM* (DEPO749); *E. umbellatum* Torr. var. *furcosum* Reveal,

uncommon, dry sands and gravels in red fir - lodgepole pine forest, 22 Jul 2001, *MA 8349* (DEPO1107, JEPS99898, RM); *E. umbellatum* var. *nevadense* Gand., uncommon, ledges and cracks in basalt outcrop, 16 Sep 1980, *SCM 245* (DEPO750), 9 Jul 1972, *KAH 171* (DEPO587); *E. wrightii* Torr. ex Benth. var. *subscaposum* S. Watson, occasional, volcanic sands and gravels in post-burned forest, granite outcrops, 27 Jul 2001, *MA 8413* (DEPO1108, JEPS99879, RM); *Oxyria digyna* (L.) Hill, uncommon, Jeffrey pine - white fir - red fir forest with lodgepole and western white pine, 24 Jun 2001, *MA 8181* (DEPO1109, JEPS99880), 16 Sep 1980, *SCM 237* (DEPO205); *Polygonum douglasii* Greene, locally common, basalt outcrop and associated seep in white fir forest, riverbank; mountain alder thickets, 26 Jun 2001, *MA 8251* (DEPO1112); *P. polygaloides* Meissner subsp. *kelloggii* (Greene) J. Hickman, locally common, wet meadows and gravel bars along river, 27 Jun 2001, *MA 8282* (DEPO1116, JEPS99883); *P. sawatchense* Small subsp. *sawatchense*, locally common, wet meadow, 26 Jul 2001, *MA 8407* (DEPO1113, JEPS99882), 26 Jun 2001, *MA 8252* (DEPO1115, RM), 23 Jun 2001, *MA 8143* (DEPO 1114); *Rumex salicifolius* J. A. Weinm., local, wet meadow; mountain alder and willow thickets, black cottonwood forest, 28 Jul 2001, *MA 8439* (DEPO1117, JEPS99884); *R. triangulivalvis* (Danser) Rech. f., occasional, wet meadow, 19 Jul 1980, *SCM 139* (DEPO211), 30 Aug 1977, *JLM* (DEPO210).

Primulaceae

Primula jeffreyi (Van Houtte) Mast & Reveal, locally abundant, wet meadows, mountain alder and willow thickets, 23 Jun 2001, *MA 8126* (DEPO1126, JEPS 99870, RM), 4 Jul 1980, *SCM 121* (DEPO216), 14 Jun 1972, *KAH 131* (DEPO52).

Ranunculaceae

Aconitum columbianum Nutt., locally common, aspen grove; wet meadow, 23 Jun 2001, *MA 8163* (DEPO1130), 23 Jun 2001, *MA 8168* (DEPO1132, JEPS99871); *Aquilegia formosa* Fisch., local, aspen grove; mountain alder thicket, black cottonwood forest, 23 Jun 2001, *MA 8160* (DEPO1133, JEPS99872), 25 Jun 1972, *KAH 159* (DEPO53); *Delphinium glaucum* S. Watson, locally common, mountain alder thickets, 29 Jul 2001, *MA 8456* (DEPO1134, JEPS99873), 9 Sep 1980, *SCM 231* (DEPO218), 26 Jul 1972, *KAH 190* (DEPO865); *D. gracilentum* Greene, occasional, open pumice soils, in disturbed area along trail in pumice-organic soil, 15 Jul 1978, *JLM* (DEPO219), 18 Jun 1972, *KAH 143* (DEPO55); *D. nuttallianum* Walp., common, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8242* (DEPO1135, JEPS99874); *D. polycladon* Eastw., uncommon, streambanks and wet drainages, 24 Jun 2001, *MA 8204* (DEPO1136, JEPS99875); *Ranunculus alismifolius* Benth. var. *alismellus* A. Gray, locally common, wet meadow, 14 Jun 1972, *KAH 130* (DEPO56); *R. cymbalaria* Pursh, local, edge of spring near river in wet meadow, 28 Jul 2001, *MA 8443* (DEPO1137, JEPS99876), 4 Jul 1977, *JLM* (DEPO220); *Thalictrum fendleri* A. Gray var. *fendleri*, common, aspen grove; black cottonwood forest, mountain alder thickets, 23 Jun 2001, *MA 8169* (DEPO1138, JEPS99877, RM), 6 Jul 1980, *SCM 126*

(DEPO221), 3 Jul 1972, *KAH 168* (DEPO623); *T. sparsiflorum* Fisch. & C.A. Mey., local, mountain alder and willow thickets, 3 Jul 2001, *MA 8294* (DEPO1139, JEPS99878).

Rhamnaceae

Ceanothus cordulatus Kellogg, locally common, red fir - white fir forest, bitter cherry shrubland, 22 Jun 2001, *MA 8116* (DEPO1140, JEPS99860, RM); *Frangula rubra* (Greene) Grubov, uncommon, east-facing slope in loose pumice on granite capped with basalt, 25 Jun 2001, *MA 8235* (DEPO1141, JEPS99859).

Rosaceae

Amelanchier utahensis Koehne, local, red fir - white fir forest, sagebrush scrub, 26 Jul 2001 *DEPO.0060.10* (DEPO1214); *Drymocallis lactea* (Greene) Rydb. var. *lactea*, common, moist, often rocky places, mountain alder and willow thickets, 22 Jun 2001, *MA 8103* (DEPO1149, JEPS99865), 3 Jul 1972, *KAH 167* (DEPO61); *Geum macrophyllum* Willd., local, wet meadows, streambanks, mountain alder and willow thickets, 3 Jul 2001, *MA 8288* (DEPO1144, JEPS99862), 25 Jul 1980, *SCM 181* (DEPO222); *Holodiscus discolor* (Pursh) Maxim var. *microphyllus* (Rydb.) Jeps., common, Jeffrey pine - red fir forest, Jeffrey pine woodland; red fir - western white pine forest, 24 Jun 2001, *MA 8212* (DEPO1145), 16 Sep 1980, *SCM 243* (DEPO224), 7 Aug 1980, *SCM 202* (DEPO223), 3 Aug 1972 *KAH 196* (DEPO58); *Horkelia fusca* Lindl. var. *parviflora* (Hook. & Arn.) Wawra, locally abundant, lodgepole pine woodland; dry meadow edges, 22 Jul 2001, *MA 8355* (DEPO1147, RM), 23 Jun 2001, *MA 8120* (DEPO1146, RM), 19 Jul 1980, *SCM 138* (DEPO225), 20 Jul 1972 *KAH 173* (DEPO59); *Ivesia santolinoides* A. Gray, local, sandy granite and pumice ledges, 24 Jun 2001, *MA 8200* (DEPO1148, JEPS99864), 15 Aug 1977, *JLM* (DEPO226); *Potentilla glaucophylla* Lehm. var. *glaucophylla*, uncommon, wet meadow, 26 Jul 2001, *DEPO.0004.01* (DEPO1206); *P. gracilis* Hook. var. *fastigiata* (Nutt.) S. Watson, locally common, wet meadow; aspen grove; willow thickets, 23 Jun 2001, *MA 8119* (DEPO1151), 23 Jun 2001, *MA 8164* (DEPO1150, JEPS99866); *Prunus emarginata* (Hook.) Walp., common, rocky slopes, chaparral, 27 Jul 2001, *MA 8416* (DEPO1155, JEPS99868), 15 Jul 2001, *MA 8338* (DEPO1154, RM), 22 Jun 2001, *MA 8085* (DEPO1152, JEPS99867); *Rosa woodsii* Lindl. subsp. *gratissima* (S. Watson) Roy L. Taylor & MacBryde, uncommon, slope of flaky rhyodacite below falls, 28 Jul 2001, *MA 8444* (DEPO1156, JEPS99849); *Sorbus californica* Greene, local, moist conifer forest, 24 Jun 2001, *MA 8179* (DEPO1157, JEPS99850); *Spiraea splendens* K. Koch, occasional, moist rocky places in conifer forest, 26 Jun 2001, *MA 8268* (DEPO1158, JEPS99851).

Rubiaceae

Galium aparine L. common, moist slope in mist of falls, 25 Jun 2001, *MA 8229* (DEPO1159, JEPS99852); *G. bifolium* S. Watson, locally common, moist gravels in conifer forest, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8244* (DEPO1161), 22 Jun 2001 *MA 8094* (DEPO1160, JEPS99853, RM); *G. trifidum* L. subsp. *subbiflorum* (Wiegand) Puff, local,

wet meadow; willow thickets, 28 Jul 2001, *MA 8441* (DEPO1163), 23 Jun 2001, *MA 8139* (DEPO1162, JEPS99854); *G. triflorum* Michx., locally abundant, lodgepole pine forest, wet meadow; mountain alder and willow thickets, 3 Jul 2001, *MA 8284* (DEPO1165, JEPS99855), 20 Jun 2001, *MA 8066* (DEPO1166, JEPS99856, RM), 18 Jun 2001, *MA 8030* (DEPO1167, JEPS99857); *Kelloggia galioides* Torr., common, red fir forest, lodgepole pine forest, black cottonwood forest, mountain alder thickets, 19 Jul 1980, *SCM 151* (DEPO235), 18 Jun 2001, *MA 8029* (DEPO1168, JEPS99858), 27 Jul 1977, *JLM* (DEPO234), 26 Jul 1972, *KAH 192* (DEPO60).

Salicaceae

Populus tremuloides Michx., uncommon, stream terraces, sagebrush scrub, 23 Jun 2001, *MA 8171* (DEPO1170, JEPS99840), 12 Sep 1972 *KAH 206* (DEPO936); *P. trichocarpa* Hook., occasional, riparian; alluvial terrace, 15 Jul 2001, *MA 8340* (DEPO1169, JEPS99839); *Salix jepsonii* C. Schneider, occasional, Riverbank; moist drainage in Jeffrey pine woodland, 18 Jun 2001, *MA 8040* (DEPO1171); *S. lasiandra* Benth. var. *lasiandra*, occasional, wet meadows and seeps, 23 Jun 2001, *MA 8122* (DEPO1176, JEPS99842), 18 Jun 2001, *MA 8037* (DEPO1174); *S. lemmonii* Bebb, common, wet meadow; forming thickets on alluvial terraces, 23 Jun 2001, *MA 8157* (DEPO1172, RM), 18 Jun 2001, *MA 8017* (DEPO1173, JEPS99841); *S. scouleriana* Hook., occasional, dry conifer forest, 27 Jul 2001, *MA 8421* (DEPO1177, JEPS99843, RM), 20 Jun 2001, *MA 8056* (DEPO1178, JEPS99844).

Saxifragaceae

Heuchera rubescens Torr., locally common, dry rocky areas in Jeffrey pine - red fir forest, Jeffrey pine - white fir - red fir forest, bitter cherry shrubland, 23 Jun 2001 *MA 8149* (DEPO1179, JEPS99845), 8 Aug 1980, *SCM 204* (DEPO231); *Lithophragma glabrum* Nutt., local, basalt outcrop and associated seep in white fir forest, lodgepole pine forest, 26 Jun 2001, *MA 8248* (DEPO1180, JEPS99846), 18 Jun 2001, *MA 8022* (DEPO1181); *Micranthes nidifica* (Greene) Small, locally common, granitic seep; moist slope in mist of falls, 25 Jun 2001, *MA 8226* (DEPO650, JEPS99848), 18 Jun 2001, *MA 8024* (DEPO1183), 18 Jun 2001, *MA 8027* (DEPO1184, RM); *M. odontoloma* (Piper) A. Heller, uncommon, moist bank of basalt columns associated with *Arnica mollis* and *Perideridia parishii*, 12 Aug 1977, *JLM* (DEPO780); *Pectiantia breweri* (A. Gray) Rydb., uncommon, mountain alder thickets, 30 Jul 2001, *MA 8470* (DEPO1182, JEPS99847).

Solanaceae

Solanum umbelliferum A. Gray, locally common, South-facing volcanic rock outcrops, bitter cherry shrubland, 22 Jun 2001, *MA 8088* (DEPO681, JEPS99812, RM).

Urticaceae

Urtica dioica L. subsp. *holosericea* (Nutt.) Thorne, local, loose pumice over sandy soil, 26 Jun 2001, *MA 8261* (DEPO684, JEPS99683).

Valerianaceae

Valeriana californica A. Heller, local, loose pumice over sandy soil, 24 Jun 2001, MA 8196 (DEPO685, JEPS99684).

Violaceae

Viola macloskeyi F. Lloyd, occasional, in wet area along trail; willow thickets, 27 Jul 1972, KAH 260 (DEPO76).

Viscaceae

Arceuthobium americanum Engelm., locally common, lodgepole pine, 15 Jul 2001 MA 8347 (DEPO686, JEPS99685).

MONOCOTS

Alliaceae

Allium validum S. Watson, local, wet meadow; stream courses, mountain alder and willow thickets, 3 Jul 2001, MA 8315 (DEPO992, JEPS99624).

Cyperaceae

Carex abrupta Mack., locally common, mountain alder and willow thickets, 30 Jul 2001, MA 8466 (DEPO626, JEPS99721), 22 Jul 2001, 8356 (DEPO630, RM), 15 Jul 2001, MA 8342 (DEPO629, JEPS99720); *C. athrostachya* Olney, locally common, wet meadow; mountain alder and willow thickets, sag pond in bench of rolling granite hill, 25 Jul 2001, MA 8369 (DEPO632, JEPS99725, RM), 25 Jul 2001, MA 8370 (DEPO633, JEPS99724), 25 Jul 2001, MA 8384 (DEPO625, JEPS99723), 25 Jul 2001, MA 8371 (DEPO631, RM), 15 Jul 2001, MA 8345 (DEPO628, JEPS99722); *C. heteroneura* W. Boott, locally common, wet meadow; mesic areas in lodgepole pine forest, mountain alder thickets, 25 Jul 2001, MA 8372 (DEPO635, JEPS99726, RM), 22 Jun 2001, MA 8108 (DEPO879, JEPS99727, RM), 18 Jun 2001, MA 8019 (DEPO636, JEPS99728); *C. hoodii* Boott, locally common, mountain alder and willow thickets, 3 Jul 2001, MA 8299 (DEPO881, RM), 24 Jun 2001, MA 8216 (DEPO880, RM); *C. integra* Mack., uncommon, wet meadow; mountain alder and willow thickets, 3 Jul 2001, MA 8300 (DEPO627, JEPS99711), 23 Jun 2001, MA 8121 (DEPO622, JEPS99710); *C. jonesii* L.H. Bailey, uncommon, intermittent stream channel and surrounding meadow, 24 Jun 2001, MA 8222 (DEPO887), 23 Jun 2001, MA 8144 (DEPO882, JEPS99712, RM); *C. lenticularis* Michx. var. *impressa* (L.H. Bailey) L.A. Standl., locally common, wet sands along river; *C. lenticularis* Michx. var. *lipocarpa* (Holm.) L.A. Standl., locally common, by water's edge, mountain alder and willow thickets, sag pond margins, 27 Jul 2001, MA 8420 (DEPO889, JEPS99823, JEPS99827), 3 Jul 2001, MA 8298 (DEPO890, JEPS99688), 3 Jul 2001, MA 8297 (DEPO891, RM), 18 Jun 2001, MA 8036 (DEPO888); *C. leporinella* Mack., local, mountain alder thickets, 27 Jul 2001, DEPO.0039.14 (DEPO1196); *C. mariposana* L.H. Bailey ex Mack., local, moist drainages, willow thickets, Jun 22 2001, MA 8107 (DEPO892, JEPS99824, JEPS99826, RM); *C. microptera* Mack.,

local, black cottonwood forest, willow thickets, 29 Jul 2001, DEPO.0019.21 (DEPO1197); *C. multcostata* Mack., common, lodgepole pine forest, red fir - white fir forest, mountain alder thickets, 30 Jul 2001, MA 8471 (DEPO621, JEPS99691), 25 Jul 2001, MA 8395 (DEPO893, JEPS99689, RM), 25 Jul 2001, MA 8398 (DEPO894, JEPS99690, RM); *C. nebrascensis* Dewey, locally common, wet meadow, 30 Jul 2001, MA 8467 (DEPO895, JEPS99672, RM), 18 Jun 2001, MA 8016 (DEPO896, JEPS99673); *C. nervina* L.H. Bailey, locally common, moist to wet places, 24 Jun 2001, MA 8206 (DEPO899, JEPS99674), 18 Jun 2001, MA 8038 (DEPO900); *C. pellita* Muhl. ex Willd., locally common, aspen grove; mountain alder and willow thickets, 30 Jul 2001, MA 8464 (DEPO883, JEPS99686, RM), 22 Jul 2001, MA 8357 (DEPO884, JEPS99687, RM), 23 Jun 2001, MA 8175 (DEPO885, RM); *C. rossii* Boott, locally abundant, dry conifer forest, wet meadow; mountain alder thickets, 24 Jun 2001, MA 8208 (DEPO902, JEPS99676), 18 Jun 2001, MA 8021 (DEPO901, JEPS99675, RM); *C. subfusca* W. Boott, common, seasonally moist areas, mountain alder thickets, wet meadow, 25 Jul 2001, MA 8389 (DEPO904, JEPS99678, RM), 24 Jun 2001, MA 8205 (DEPO903, JEPS99677); *C. utriculata* Boott, locally abundant, wet meadow; willow thickets, 23 Jun 2001, MA 8155 (DEPO905, JEPS99822, JEPS99828); *C. vesicaria* L., locally abundant, sag pond in bench of rolling granite hills, wet meadow, 26 Jul 2001, DEPO.0024.02 (DEPO1198), 25 Jul 2001, MA 8388 (DEPO906, RM), 15 Jul 2001, MA 8346 (DEPO907, JEPS99679); *C. whitneyi* Olney, uncommon, dry sandy areas in red fir - white fir forest, 28 Jul 2001, DEPO.0038.13 (DEPO1199); *C. squarrosus* L., uncommon, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, MA 8257 (DEPO908, JEPS99680); *Eleocharis bella* (Piper) Svenson, locally common, wet meadow in saturated soil, 25 Jul 2001, MA 8380 (DEPO910, JEPS99681); *E. macrostachya* Britton, locally common, wet meadow in saturated soil and muck, 25 Jul 2001, MA 8387 (DEPO911, JEPS99662, RM); *Scirpus microcarpus* J. Presl & C. Presl, locally common, wet meadow; mountain alder and willow thickets, 29 Jul 2001, MA 8462 (DEPO912), 23 Jun 2001, MA 8156 (DEPO624, JEPS99663).

Iridaceae

Sisyrinchium idahoense E.P. Bicknell var. *occidentale* (E.P. Bicknell) Douglass M. Hend., uncommon, 8 Sep 1980, SCM 208 (DEPO145).

Juncaceae

Juncus balticus Willd., locally common, granite seep near river in loamy sand; wet meadow, 15 Jul 2001, MA 8334 (DEPO970, JEPS99633); *J. drummondii* E. Mey., locally common, moist rocky places in Jeffrey pine - white fir - red fir forest, 20 Jun 2001, MA 8046 (DEPO971, JEPS99634, RM); *J. nevadensis* S. Watson, common, wet meadow; mountain alder and willow thickets, alder grove; black cottonwood forest, 25 Jul 2001, MA 8383 (DEPO976, JEPS99637), 3 Jul 2001, MA 8293 (DEPO973, JEPS99638), 22 Jul 2001, MA 8362 (DEPO975, RM), 20 Jun 2001, MA 8074 (DEPO972, JEPS99635), 20 Jun 2001, MA 8075 (DEPO974, RM), 18 Jun 2001, MA 8039 (DEPO979),

18 Jun 2001, *MA 8041* (DEPO978, JEPS99636), 20 Jul 1980, *SCM 160* (DEPO146), 18 Jun 1972, *KAH 150* (DEPO34); *J. orthophyllus* Coville, uncommon, wet meadow; streambanks, 26 Jul 2001, *DEPO.0004.08* (DEPO1203); *J. parryi* Engelm., locally common, dry slopes in lodgepole pine forest and red fir - western white pine forest, huckleberry oak shrubland, 25 Jul 2001, *DEPO.0030.02* (DEPO1204); *J. saximontanus* A. Nelson, uncommon, mountain alder thickets, 22 Jul 2001, *MA 8361* (DEPO982); *Luzula comosa* E. Mey., uncommon, intermittent streamcourse; wet meadow, 23 Jun 2001, *MA 8145* (DEPO983, JEPS99639, RM); *L. parviflora* (Ehrh.) Desv, locally common, moist bench in slope of large granite outcrop; mountain alder and willow thickets, 3 Jul 2001, *MA 8291* (DEPO985, RM), 20 Jun 2001, *MA 8073* (DEPO984, JEPS99640).

Juncaginaceae

Triglochin maritima L., uncommon, rock ledge along river with granite substrate, 23 Jun 2001, *MA 8146* (DEPO986).

Liliaceae

Calochortus leichtlinii Hook. f., occasional, open areas in conifer forest, edge of landslide, 26 Jun 2001, *MA 8262* (DEPO994), 4 Aug 1980, *SCM 199* (DEPO150); *Fritillaria atropurpurea* Nutt., uncommon, edge of landslide in lodgepole and Jeffrey pine, 18 Jun 2001, *MA 8025* (DEPO995, JEPS99625); *Lilium kelleyanum* Lemmon, locally common, moist drainages, 24 Jun 2001, *MA 8201* (DEPO996, JEPS99626), 26 Jul 1972 *KAH 194* (DEPO37).

Melanthiaceae

Toxicoscordion venenosum (S. Watson) Rydb. var. *venosum*, local, moist shaded areas, lodgepole pine forest, 3 Jul 2001, *MA 8316* (DEPO1005, JEPS99630), 18 Jun 2001, *MA 8028* (DEPO1004); *Veratrum californicum* Durand var. *californicum*, local, willow thickets, moist road verge, 10 Aug 1980, *SCM 209* (DEPO155).

Orchidaceae

Corallorhiza maculata (Raf.) Raf., uncommon, red fir forest, 24 Jul 2001, *MA 8366* (DEPO1044, JEPS99609); *Platanthera dilatata* (Pursh) Lindl. ex L.C. Beck var. *leucostachys* (Lindl.) Luer, locally common, wet meadow, mountain alder and willow thickets, moist road verge, 23 Jun 2001, *MA 8123* (DEPO1045, JEPS99610); *Spiranthes romanzoffiana* Cham., local, wet meadow; mountain alder and willow thickets, 29 Jul 2001, *MA 8459* (DEPO1046, JEPS99611).

Poaceae

Agrostis exarata Trin., uncommon, mountain alder and willow thickets, 7/22/2001 *MA 8363* (DEPO1049, JEPS99715); *A. humilis* Vasey, uncommon, mountain alder thickets, 22 Jul 2001, *MA 8365* (DEPO1054, JEPS99718); *A. idahoensis* Nash, common, mountain alder thickets, basalt outcrop and associated seep in white fir forest, 26 Jun 2001, *MA 8245* (DEPO1050,

JEPS99716); *A. scabra* Willd., common, mountain alder and willow thickets, granite outcrop in lodgepole pine forest, 22 Jul 2001, *MA 8364* (DEPO1053, RM), 3 Jul 2001, *MA 8310* (DEPO1051, JEPS99717); *A. variabilis* Rydb., local, mountain alder thickets, lodgepole pine woodland; Jeffrey pine woodland, 26 Jul 2001, *DEPO.0014.05* (DEPO1213); *Bromus ciliatus* L., occasional, wet meadow; stream channels, mountain alder and willow thickets, 30 Aug 1980, *SCM 220* (DEPO170); *B. laevipes* Shear, locally common, basalt scree in lodgepole pine forest, lodgepole pine woodland, Jeffrey pine woodland, red fir - white fir forest, sagebrush scrub, black cottonwood forest, mountain alder thickets, 22 Jul 2001, *MA 8351* (DEPO1056, JEPS99719, RM), 3 Jul 2001, *MA 8319* (DEPO1055, JEPS99920), 22 Jun 2001, *MA 8106* (DEPO1057, RM); *B. suksdorfii* Vasey, local, aspen grove; lodgepole pine woodland, 23 Jun 2001, *MA 8172* (DEPO1058, JEPS99921); *Calamagrostis canadensis* (Michx.) P. Beauv., locally common, seeps, wet meadow, 15 Jul 2001, *MA 8331* (DEPO1059, JEPS99922, RM); *C. stricta* (Timm) Koeler subsp. *inexpansa* (A. Gray) C.W. Greene, locally common, wet meadow; willow thickets, 28 Jul 2001, *MA 8435* (DEPO655, JEPS99923, RM); *Cinna bolanderi* Scribn., uncommon, moist drainage from spring associated with basalt outcrops over granite in Jeffrey pine - red fir forest, 27 Jul 2001, *MA 8425* (DEPO656, JEPS99924); *Danthonia intermedia* Vasey, uncommon, mesic lodgepole pine forest, 26 Jul 2001, *DEPO.0003.07* (DEPO1201); *Deschampsia cespitosa* (L.) Beauv. subsp. *cespitosa*, local, wet meadow, 30 Aug 1980, *SCM 216* (DEPO173); *D. danthonioides* (Trin.) Benth, locally common, moist slope in mist of falls, basalt outcrop and associated seep in white fir forest, willow thickets, 25 Jun 2001, *MA 8228* (DEPO657, JEPS99925), 26 Jun 2001, *MA 8255* (DEPO659, RM); *D. elongata* (Hook.) Benth., local, wet meadow, 3 Jul 2001, *MA 8303* (DEPO660, JEPS99926); *Distichlis spicata* (L.) Greene, uncommon, granite seep along river, 15 Jul 2001, *MA 8332* (DEPO1060, JEPS99927); *Elymus elymoides* (Raf.) Swezey var. *californicus* (J.G. Sm.) J.P. Sm, common, rock outcrops, Jeffrey pine - red fir forest, 25 Jul 2001, *MA 8393A* (DEPO1061); *E. elymoides* (Raf.) Swezey var. *elymoides*, common, granite outcrop; sag pond in Jeffrey pine - white fir forest, mountain alder thickets, 20 Jun 2001, *MA 8071* (DEPO1062, JEPS99928, RM); *E. glaucus* Buckley subsp. *glaucus*, locally abundant, sag pond in bench of rolling granite hills, wet meadow; mountain alder and willow thickets, Jeffrey pine woodland, 25 Jul 2001, *MA 8374* (DEPO1064, JEPS99929), 15 Jul 2001, *MA 8344* (DEPO1063, RM); *E. trachycaulus* (Link.) Shinn. subsp. *trachycaulus*, local, granite seep; slope of flaky rhyodacite just below falls, mesic lodgepole pine forest, wet meadow; willow thickets, 129 Jul 2001, *MA 8455* (DEPO1067), 5 Jul 2001, *MA 8333* (DEPO1066, JEPS99907); *E. triticoides* Buckley, uncommon, wet meadow, 31 Jul 1977 *JLM* (DEPO719); *Glyceria elata* (Nash ex Rydb.) M.E. Jones, locally common, moist bench in slope of large granite outcrop; sag pond in Jeffrey pine - white fir forest, mountain alder and willow thickets, aspen grove; black cottonwood forest, mesic lodgepole pine forest, wet meadow, 29 Jul 2001, *MA 8457* (DEPO1068, JEPS99909), 23 Jun 2001, *MA 8173* (DEPO1070, JEPS99910, RM), 20 Jun 2001, *MA 8072* (DEPO1069, JEPS99908, RM); *G. striata* (Lam.) Hitchc., uncommon, willow thickets, 30 Jul 2001, *MA 8465*

(DEPO1071); *Hordeum brachyantherum* Nevski subsp. *californicum* (Covas & Stebbins) Bothmer, N. Jacobson, & Seberg, abundant, wet meadow; mountain alder and willow thickets, aspen grove, 23 Jun 2001, *MA 8170* (DEPO1072, JEPS99911); *Melica bulbosa* Geyer ex Porter & J.M. Coult., uncommon, rock outcrop in bitter cherry shrubland, 30 Jul 2001, *DEPO.0041.14* (DEPO1205); *M. harfordii* Bol., uncommon, wet meadow, 30 Aug 1980, *SCM 219* (DEPO180); *M. stricta* Bol., occasional, Jeffrey pine forest, 24 Jun 2001, *MA 8210* (DEPO1073, JEPS99912); *Muhlenbergia andina* (Nutt.) Hitchc., uncommon, red fir - white fir forest, 26 Jul 2001, *MA 8406* (DEPO1074, JEPS99913); *M. filiformis* (Thurb. ex S. Watson) Rydb, locally abundant, basalt outcrop and associated seep in white fir forest, wet meadow and gravel bars near river; mountain alder and willow thickets, 3 Jul 2001, *MA 8301* (DEPO1077), 27 Jun 2001, *MA 8277* (DEPO1075, RM), 26 Jun 2001, *MA 8256* (DEPO1076, JEPS99813); *M. richardsonis* (Trin.) Rydb, common, Jeffrey pine forest with scattered western juniper; wet meadow; gravel bars near river; mountain alder thickets, 27 Jun 2001, *MA 8276* (DEPO1079, RM), 24 Jun 2001, *MA 8209* (DEPO1078, JEPS99914); *Phleum alpinum* L., common, wet meadow, intermittent streamcourse, willow thickets, 23 Jun 2001, *MA 8124* (DEPO1080, JEPS99915); **P. pratense* L., native to Eurasia, uncommon, meadow edge, 11 Sep 1980, *SCM 234* (DEPO730); **Poa annua* L., native to Europe, occasional, islet with mountain alder and willow thickets, 3 Jul 2001, *MA 8302* (DEPO1081, JEPS99916); *P. bolanderi* Vasey, uncommon, red fir forest, red fir - white fir forest, mesic lodgepole pine forest, Jeffrey pine woodland, mountain hemlock forest, 20 Jun 2001, *MA 8050* (DEPO1082, JEPS99899, RM); **P. pratensis* L. subsp. *pratensis*, native to Europe, uncommon, wet meadow; gravel bars near river; mountain alder and willow thickets, 27 Jun 2001, *MA 8275* (DEPO648, JEPS99900), 27 Jun 2001, *MA 8278* (DEPO646, RM); *P. secunda* J. Presl subsp. *secunda*, common, Jeffrey pine - white fir forest, basalt outcrop and associated seep in white fir forest, basalt outcrop in lodgepole pine forest, 25 Jul 2001, *MA 8394* (DEPO1083, JEPS99901), 26 Jun 2001, *MA 8258* (DEPO645), 22 Jun 2001, *MA 8086* (DEPO925, RM); *P. wheeleri* Vasey, uncommon, red fir forest, lodgepole pine forest, Jeffrey pine - white fir - red fir forest, sagebrush scrub; bitter cherry shrubland, 24 Jun 2001, *MA 8184* (DEPO926, JEPS99903, RM), 22 Jun 2001, *MA 8087* (DEPO1085, JEPS99902), 22 Jun 2001, *MA 8105* (DEPO1084); *Scribneria bolanderi* (Thurb.) Hack., uncommon, granitic seep, 18 Jun 2001, *MA 8045* (DEPO1086, JEPS99904); *Stipa lemmonii* (Vasey) Scribn., local, mesic lodgepole pine forest, wet meadow, 26 Jul 2001, *DEPO.0006.09* (DEPO1211); *S. occidentalis* Thurb. ex S. Watson var. *californica* (Merr. & Burt Davy) C.L. Hitchc., occasional, red fir - white fir forest, post-burn shrubland, 25 Jul 2001, *MA 8393B* (DEPO 927, JEPS99713); *S. occidentalis* Thurb. ex S. Watson var. *occidentalis*, abundant, red fir - white fir forest, lodgepole pine forest and woodland; Jeffrey pine - red fir forest, red fir - western white pine forest, 22 Jul 2001, *MA 8352* (DEPO929, JEPS99714), 3 Jul 2001, *MA 8323* (DEPO1048, RM), 24 Jun 2001, *MA 8194* (DEPO928); *S. occidentalis* Thurb. ex S. Watson var. *pubescens* (Vasey) J. Maze, Roy L. Taylor & MacBryde, local, red fir - white fir forest, 26 Jul 2001, *DEPO.0060.03* (DEPO 1212); *Trisetum canescens* Buckley, common, lodgepole pine woodland; mesic lodgepole pine forest, willow

thickets, 25 Jul 2001, *MA 8373* (DEPO1087, JEPS99917), 3 Jul 2001, *MA 8314* (DEPO1088, RM); *T. spicatum* (L.) K. Richt., locally abundant, dry to moist sites in coniferous forest, 24 Jun 2001, *MA 8183* (DEPO1089, JEPS99918).

Potamogetonaceae

Potamogeton gramineus L., local, wet meadow dominated by *Carex vesicaria*, 25 Jul 2001, *MA 8386* (DEPO1125, JEPS99869, RM).

Ruscaceae

Maianthemum racemosum (L.) Link, locally common, moist areas in coniferous forest, 3 Jul 2001, *MA 8308* (DEPO997, RM), 24 Jun 2001, *MA 8180* (DEPO998, JEPS99627), 16 Sep 1980, *SCM 242* (DEPO153), 27 Jun 1977, *JLM* (DEPO532); *M. stellatum* (L.) Link, local, moist areas in lodgepole pine forest and Jeffrey pine - red fir forest, mountain alder and willow thickets, 3 Jul 2001, *MA 8307* (DEPO999, RM), 23 Jun 2001, *MA 8153* (DEPO1000, JEPS99628).

Themidaceae

Brodiaea elegans Hoover subsp. *elegans*, uncommon, on top of volcanic cliffs in post-burned forest, 27 Jul 2001, *MA 8412* (DEPO993); *Triteleia ixioides* (W.T. Aiton) Greene subsp. *anilina* (Greene) L.W. Lenz, occasional, moist slope in mist of falls, sandy flats along river, 1 Jul 1980, *SCM 104* (DEPO475), 25 Jun 2001, *MA 8232* (DEPO1001, JEPS99629), 24 Jun 2001, *MA 8219* (DEPO1003), 18 Jun 1972, *KAH 154* (DEPO1099).

Typhaceae

Sparganium emersum Rehmman, uncommon, sag pond in post-burn red fir - lodgepole pine forest, 26 Jul 2001, *MA 8402* (DEPO682, JEPS99682); *Typha latifolia* L., uncommon, wet meadow dominated by *Carex vesicaria*, 25 Jul 2001, *MA 8390* (DEPO683).

APPENDIX 2

LIST 2

List of taxa reported in Devils Postpile National Monument but without current voucher documentation. List is organized by clade following the second edition of *The Jepson Manual* (Baldwin et al. 2012), family, taxon name (alphabetical within family), the reported name if different from the currently accepted name, DEPO voucher redetermination, and comments.

Ferns

Ophioglossaceae: *Botrychium simplex* E. Hitchc.

Eudicots

Apiaceae: *Perideridia bolanderi* (A. Gray) A. Nelson & J.F. Macbr. Asteraceae: *Antennaria argentea* Benth., *SCM 120* (DEPO91) voucher redet *A. corymbosa* E.E.

Nelson; *Cirsium occidentale* (Nutt.) Jeps. var. *californicum* (A. Gray) D.J. Keil & C.E. Turner., reported as *C. californicum* A. Gray, out of elevational range, unlikely in DEPO (CNPS 1B02); *Symphytotrichum lentum* (Greene) G.L. Nesom, reported as *Aster lentus* Greene. Boraginaceae: *Mertensia ciliata* (James ex Torr.) G. Don var. *stomatechoides* (Kellogg) Jeps. Brassicaceae: *Cardamine californica* (Nutt.) Greene, reported as *Dentaria californica* Nutt. Cornaceae: *Cornus sericea* L. subsp. *occidentalis* (Torr. & A. Gray) Fosberg, reported as *C. occidentalis* (Torr. & A. Gray) Coville. Ericaceae: *Rhododendron occidentale* (Torr. & A. Gray) A. Gray. Fabaceae: *Acmispon nevadensis* (S. Watson) Brouillet, reported as *Lotus nevadensis* (S. Watson) Greene; *Lupinus duranii* Eastw. (CNPS 1B.02), *JM s.n.*, *KAH142* (DEPO1033, DEPO27) vouchers redet *L. lepidus* Douglas ex Lindl. var. *sellulus* (Kellogg) Barneby; *Trifolium microcephalum* Pursh. Grossulariaceae: *Ribes montigenum* McClatchie. Liliaceae: *Lilium pardalinum* Kellogg; *Lilium parvum* Kellogg. Onagraceae: *Oenothera elata* Kunth subsp. *hirsutissima* (A. Gray ex S. Watson) W. Dietr. *O. hookeri* Torr. & A. Gray subsp. *angustifolia* (R.R. Gates) Munz. Polemoniaceae: *Phlox diffusa* Benth. Polygonaceae: *Polygonum minimum* S. Watson, *SCM 175* (DEPO209) voucher redet *P. polygaloides* Meisn. subsp. *kelloggii* (Greene) J.C. Hickman. Rhamnaceae: *Rhamnus ilicifolia* Kellogg, reported as *R. crocea* Nutt. subsp. *ilicifolia* (Kellogg) C.B. Wolf. Rosaceae: *Fragaria vesca* L., reported as *F. vesca* L. subsp. *californica* (Cham. & Schldtl.) Staudt; *Rosa californica* Cham. & Schldtl.; *Rubus parviflorus* Nutt. Orobanchaceae: *Pedicularis groenlandica* Retz. Viscaceae: *Arceuthobium campylopodum* Engelm.

Monocots

Orchidaceae: *Platanthera sparsiflora* (S. Watson) Schltr. Parnassiaceae: *Parnassia palustris* L., reported as *P. palustris* L. var. *californica* A. Gray, occurs near DEPO on Minaret Creek, but not found in DEPO. Poaceae: *Bromus carinatus* Hook. & Arn.; *Bromus tectorum* L., observed near Rainbow Falls by vegetation mapping field crew but no collection made; *Muhlenbergia montana* (Nutt.) Hitchc. Themidaceae: *Triteleia montana* Hoover, reported as *Brodiaea gracilis* S. Watson.

APPENDIX 3

LIST 3

Potential range extensions. List is organized by clade following the second edition of *The Jepson Manual* (Baldwin et al. 2012), family, taxon name (alphabetical within family), range and geographic distribution string given in the online Jepson eFlora (Jepson Flora Project 2013), and comments regarding range and distribution.

Eudicots

Asteraceae: *Pseudognaphalium californicum* (DC.) Anderb., 60–800 m, CA-FP (exc GV), OR, Baja California. Extension of elevation to < 1800 m;

Symphytotrichum bracteolatum (Nutt.) G.L. Nesom, 500–2000 m. CaR, SN, GB; to British Columbia, CO. Minor extension in elevation to 2336 m. Brassicaceae: *Boechera divaricarpa* (A. Nelson [pro sp.] Á. Löve & D. Löve, 900–2200 m. CaRH, MP, to WA, WY. Range extension into a new geographic subdivision of California to central High Sierra Nevada (cSNH). Plantaginaceae: *Penstemon heterodoxus* A. Gray var. *cephalophorus* (Greene) N.H. Holmgren, 1900–3200 m, n&s SNH. Range extension into central High Sierra Nevada (c SNH). Polygonaceae: *Eriogonum umbellatum* Torr. var. *nevadense* Gand., (1000)1500–3000 m, SN (e slope), GB, nw DMoj, southeastern OR, western NV. Extension in elevation to 3200 m, and range extension into the western slope of the Sierra Nevada, supported by Botti (2001). Rubiaceae: *Galium aparine* L., 30–1500 m, CA (exc DSon), to AK, eastern North America, Europe. Significant extension in elevation to 2235 m.

Monocots

Cyperaceae: *Cyperus squarrosus* L., < 1500 m, CA, temp and trop more or less worldwide. Significant extension in elevation to 2347 m. Poaceae: *Distichlis spicata* (L.) Greene, < 1550 m. CA; southern Canada, United States. Significant extension in elevation to 2329 m; *Elymus elymoides* (Raf.) Swezey var. *elymoides*, 250–4300 m. SnFrB, TR, SnJt, GB, D; to WA, WY, CO. Range extension into a new geographic subdivision of California to central High Sierra Nevada (cSNH).

APPENDIX 4

LIST 4

List of taxa with collections present in the Consortium of California Herbaria (CCH) not encountered during this study and vouchers not examined. Taxa reported in CCH but with locations determined to be outside of DEPO have been excluded. List is organized by clade following the second edition of *The Jepson Manual* (Baldwin et al. 2012), family, taxon name (alphabetical within family), and herbarium accession number.

Ferns

Pteridaceae: *Cheilanthes gracillima* D.C. Eaton (CAS553703).

Eudicots

Asteraceae: *Arnica amplexifolia* Rydb. [current name *A. lanceolata* subsp. *prima*] (YM-YOSE63533). Onagraceae: *Epilobium exaltatum* Drew (UCR142843). Polemoniaceae: *Ipomopsis aggregata* (Pursh) V.E. Grant subsp. *bridgesii* (A. Gray) V.E. Grant & A.D. Grant (CHSC64048). Plantaginaceae: *Penstemon heterodoxus* A. Gray var. *heterodoxus* (CAS641394); *P. speciosus* Douglas ex Lindl. subsp. *kennedyi* (A. Nelson) D.D. Keck [current name *P. speciosus*] (YM-YOSE66454).